DOCUMENT RESUME

ED 205 188 IR 009 491

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TITLE Nonverbal Behaviors in Presearch Interviews.
INSTITUTION Syracuse Univ., N.Y. School of Information Studies.
SPONS AGENCY National Library of Medicine (DHEW), Bethesda, Md.
PUB DATE Apr 81
GRANT 1-R01-LM03074
NOTE 90p.: Report of the Presearch Interview Project. For related documents, see IR 009 485-490 and IR 009 492-493. Tables will not reproduce clearly.

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Body Language: Codification: Information Retrieval: Information Seeking: *Interviews: *Librarians: Medical Libraries: *Nonverbal Communication: Questioning Techniques: User Satisfaction (Information)
IDENTIFIERS *Library Users: Search Intermediaries: *Search Negotiation (Computer Science)

ABSTRACT

This study to identify the nonverbal behaviors of librarians and library users that facilitate or impede information exchange in presearch interviews for computer-based literature searches was part of a larger research project that gathered data on 80 presearch interviews in seven medical libraries. The project also sought (1) to identify verbal behaviors of requesters and search intermediaries: (2) to identify tasks that are accomplished by the librarian to facilitate information exchange: and (3) to objectively code videotaped presearch interviews in terms of the extent to which those tasks were accomplished. The procedures involved in interview selection, nonverbal variables selection, and coding are described, and the results of the analysis are detailed. A bibliography lists 20 sources. (FM)

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NONVERBAL BEHAVIORS IN PRESEARCH INTERVIEWS

by

Bissy Genova

April 1981

A report of the Presearch Interview Project
(NLM Grant No.1 R01 LM03074-01)

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IR009491

LIST OF REPORTS OF
THE PRESEARCH INTERVIEW PROJECT
(NLM Grant No.1 RO1 LM03074-01)

Date	Title	Author(s)
Feb. 1, 1980	Progress Report for May 1, 1979 to January 15, 1980	Crouch and Atherton
March 7, 1980	Codebook and Frequency Distributions for Quantifiable Data	Tessier and Fargnoli
July 4, 1980	Analysis of Verbal Behaviors in the Presearch Interview: Codebook with Instructions for Transcribing Interviews	Crouch and Lucia
April 1981	Descriptive Account of Stimulated Recall Sessions with Requesters that Followed Presearch Interviews	Wargula, Lucia and Fargnoli
April 1981	Satisfaction Measures in Presearch Interviews	Tessier
April 1981	Verbal Behaviors of Librarians in Presearch Interviews	Crouch
April 1981	Nonverbal Behaviors in Presearch Interviews	Genova
April 1981	Tasks Performed by Online Searchers in Presearch Interviews	Cochrane
May 1981	Executive Summary, Project Bibliography, and Sample Data	Cochrane

Contents

Page

I. Introduction i

II. Procedures 1
Interview selection 1
Nonverbal variables selection and coding . . . 1
Coding definitions 3

III. Results 4
Descriptive statistics 4
Analysis of first interviews for each librarian 16
Terminal use in interviews 21
Relation of satisfaction measures to nonverbal variables 23
Satisfaction differences between selected groups of interviews 28
Interview groups presenting contrasts in satisfaction assessments 34

IV. Conclusions 46

Appendix 1. Satisfaction measure subset used 49

Appendix 2. Comparison of first interviews for librarians with all other interviews . . . 50

Appendix 3. Pairs of motility scores and correlation coefficients 63

Appendix 4. Codebook for Nonverbal Behavior . . . . . ~~64~~ Not Included

Bibliography 65

Figure 1. Case by Variable 50 & 41/ Respondent=2(Req.) 39

Figure 2. Case by Variable 50 & 41/ Respondent=1(Librn.) 41

Figure 3. Case by Variable 50 & 41/Respondent=1(Librn.) 43

Figure 4. Case by Variable 41 & 50/Respondent=1(Librn.) 45

Table 1. Interview Length 4

Table 2. Interruptions 4

Table 3. Requester Experience 5

Table 4. Requester Knowledge 5

Table 5. Shared Laughter 6

Table 6. Shared Smiles 6

Table 7. Eye Contact 7

Table 8. Laugh Alone 7

Table 9. Smile Alone 8

Table 10. Look Alone 9

Table 11. Nods 10

Table 12. Gesturing 11

Table 13. Adaptors (Body) 12

Table 14. Adaptors (Object) 13

Table 15. Shifts 14

Table 16. Idleness 15

Table 17. Type of Idleness 15

Table 18. Idle Activity 17

Table 19. Paired Outliers in Same Interview 19

Table 20. Partial Correlation Coefficients Between Requester's Own and Librarian's Own Nonverbal Behaviors 20

Table 21. Terminal Use and Requester's Activity 22

Table 22. Terminal Use and Librarian Behavior 24

Table 23. Terminal Use and Idleness; and Idle Activity of Participants 25

Table 24. Satisfaction Measures and Associated Variables 27

Table 25. Comparisons of Satisfaction Averages for Interviews Grouped According to Use/ Non-Use of Terminal, First/Non-First, and Overall 29

Table 26. Requester Touch Adaptors by Groups, Satisfaction on 50/41 ("Interview Meeting Expectations") 38

Table 27. Librarian Looking Alone by Groups, Satisfaction on 50/41 40

Table 28. Librarian Touch Adaptors by Groups, Satisfaction on 50/41 42

Table 29. Librarian Shifts by Groups, Satisfaction on 50/41 44

I. Introduction

The goal of our examination is exploratory. We have no basis for postulating specific relationships between satisfaction measures (for either librarians or users) and nonverbal behaviors exhibited during the interviews. However, the intent is to offer descriptive data on concomitant patterns as found. Such data should present supportive information to the analyses done in terms of task performance and related linguistic features. In accordance with this goal, our method was subordinate to the above mentioned approaches and aimed to fill this supportive function.

Nonverbal communication refers to all of the ways we can communicate other than through words. Communication is a multichannel system, which allows a great deal of redundancy to assure better and accurate reception. Some of us place a great deal of emphasis upon verbal channels while others rely a great deal on nonverbal channels. According to the concept of equifinality, the important goal is that the same meaning be reached. Nonverbal communication need not be intentional. There can be certain facial expressions, gestures, eye behaviors, and other types of nonverbal messages that the sender may not be trying to communicate to a receiver and that the receiver understands are unconscious messages on the part of the communicator. In the same way, nonverbal communication need not be consciously received; the receiver need not consciously understand the meaning of the message or even consciously recognize that a message

has been received. The various forms of nonverbal communication fall into bodily codes and other nonverbal codes. Bodily codes are physical appearance, posture, facial expression, eye behavior, bodily movement, touch, and vocalics. Other codes are cues such as environment, artifacts, time, and space. For the purpose of our analysis we have narrowed down the scope of nonverbal behavior in this study to a subset of the full nonverbal repertoire, as follows: posture -- torso shift; facial -- smile and laugh; eye behavior -- eye contact and glances: body movement -- hand and head moves. The reasons for that are two-fold: (1) the limitations of what could be observed in the study context; and (2) emphasis on interactional aspects of the interview and the most revealing nonverbal behaviors observable by us.

Posture refers to positions in which we place the body for a relatively long period of time -- standing, sitting, or reclining. Posture is one of the few bodily nonverbal cues that is active at all times, both during and outside a communicative interaction. As our study was limited to one posture only -- sitting, we elected shifts within that position for special attention and monitoring. Further, the special and proxemic constraints of the interview setting limited the possible range of trunk shifts that could occur, with the exception of those adjusting the sitting posture or direction, and generally associated with restlessness. Less frequently manifested were shifts of approach/distancing, associated with interest/liking or lack of these.

Facial expressions are the most extensively studied non-

verbal cue areas, partly due to the belief that the face is the most important expressive area, at least to the untrained observer. The other side of the issue here is that through socialization people gain the most control of their facial expressions, compared to other body areas. So to the trained observer, the face is a less valuable cue area compared to feet or hands. Given the constraints of our visual material, we excluded aspects of facial displays in areas other than the mouth, and micromomentary displays or blends (mixtures and contradictory cues). We narrowed down our observations to smiles and laughs, documented as the most reliable displays of basic affect across people and cultures.

Eye behaviors include gaze, its direction, and also pupillary responses (the latter was inaccessible to us in this study). Eye behavior refers to the way people look at one another before, during, and after interaction. Many eye behaviors occur below the awareness level and as such are a valuable indicator or affect. We monitored the pattern of eye contact and isolated gaze, as such eye behavior plays a regulatory role in the flow of interaction and the turn-taking during a conversation. Breaking of eye contact may indicate negative affect or lack of attention; continuous seeking of eye contact may indicate anxiety; avoidance of eye contact disrupts the interactive flow.

Body movement (kinesics) refers to the motion of various parts of the body -- arms, hands, foot and leg, head and shoulders. These movements have been extensively used and can be broken down into five basic categories: emblems, illustrators, regulators,

self adaptors, and object adaptors. Emblems are easily translated into words, such as the finger sign for "A-OK". Illustrators are usually hand movements which punctuate speech, such as use of fist to emphasize a verbal assertion. Regulators facilitate interaction and replace the flow, such as head nods or hand gestures, both generally occuring below the awareness level. Adaptors are primary affect cues. Self adaptors involve hand touch on self, i.e., stroking the chin, rubbing hands, pinching own skin, etc. Object adaptors involve fiddling with external objects -- playing with a pencil, clutching the arm of a chair, etc. Adaptors are complex and rich cues still under extensive study. Currently they are generally viewed as extensions of involuntary motor behavior associated with stress, discomfort, or negative affects. As unintentional (below awareness) movements, they are viewed as fairly reliable indicators of negative emotional states.

We focused our attention on a subset of body movements -- nods and gestures as regulators, and hand uses as self and object adaptors.

The empirical study of nonverbal behaviors in the last two decades has moved forward due to the efforts of pioneers from the fields of communication (Ekman and Friesen), linguists and social anthropologists like Birdwhistell and Mehrabian, or psychologists like Freedman. Much valuable work on detailed aspects of face to face communication, stressful interaction, and internal states comes from experimental work in psychiatry and therapy (Mahl, Rosenfeld, Freedman). While an extensive review of the

accumulated body of information which guided us in our descriptive work would exceed the scope and goals of this paper, several highlights are in order. Much of what we know about the facial and bodily expressions of emotion comes from the continuing research work of Ekman and Friesen carried out at the Human Interaction Laboratory in San Francisco. Their focus has been on valid interpretations of distinct nonverbal behaviors, their function in revealing and disguising affect, as well as "leakages" revealing deception. Mehrabian's work on interpersonal attitude expression developed the concept of immediacy (liking and dislike), power (dominance-submission), and responsiveness (active-passive) as aspects of dyadic encounters. Mahl, Rosenfeld, and Freedman have studied various contents of dyadic interactions as well. When two or more individuals interact, a great many nonverbal cues occur in two important places -- as part of the message and as part of the feedback. Nonverbal cues help initiate, maintain, regulate, and terminate interactions as a continuous pattern of signal use and taking of turns between speakers and listeners. For example, a smile or a nod may signal that the receiver has heard you, understands, or agrees. Eye behavior plays a role at juncture points in interaction, such as wish to interrupt, continued interest, or request for feedback. For example, a speaker will look at a listener to indicate desire for response or to relinquish the speaking turn. In general, speakers look less at listeners, while the receiver looks almost continuously at the speaker. Therefore, change (breakage) in the eye behavior of the listener

may indicate termination or negative feedback.

The major function of feedback is to provide the potential users with different kinds of information. Increasingly, scholars are recognizing the primary importance of the informative function of feedback. Thus, Clement and Frandsen write that feedback signals "essentially provide information and/or guidance. Both the theoretical and empirical literature support the view that feedback in human communication involves information: the imparting of knowledge of performance, and degree of progress, of effect on others, etc."

While the nonverbal and verbal behaviors which are used in feedback responses are usually co-occurring and are interrelated phenomena, they frequently function on different levels to provide different types of information to individuals who perceive such behaviors. Nonverbal and verbal symbols may function to provide different types of information about the content versus the relationship dimensions of the interaction. Krippendorff also reinforces the related idea that the rich flow of information behavior systems can be decomposed into relatively independent channels, each with its own properties. Leathers studied nonverbal behaviors used for feedback responses in dyadic interaction along four factors: responsiveness, emotion, deliberation, and assurance. His results indicate that the responsiveness factor accounted for 40% of the variance in nonverbal feedback behavior. The responsiveness factor involved nonverbal behaviors to express interest-disinterest, attentiveness-distraction, responsive-unresponsive, and involved-withdrawn. Emotion

accounted for another 17% of the variance and included pleasure-displeasure, and friendliness-hostility. As examples from the nonverbal behaviors chosen for analysis by us, eye contact, nods, gestures, and shifts would fall within the responsiveness area. Smile, laugh, and adaptors (self and object hand touch) would fall within the emotion factor. This is consistent with Freedman's results on the use of spontaneous movements during dialogue and anxiety situations, finding significant association with object and body focused movements (i.e., adaptors).

One characteristic of self adaptor behavior, according to Ekman and Friesen, is that it occurs in connection with a variety of problems and needs, e.g., when verbal communication is hindered in some way. Several "hindering" factors emerge as potential elicitors of adaptive behavior. Freedman et al. studied movement during varying communicative climates and found that interpersonal stress increases self adaptors, while reducing regulator and illustrator gestures. These results are consistent with Germana who found both self and object touch adaptors associated with reported anxiety, apprehension, or general tension of subjects.

So guided by known attributes and functions of the nonverbal behaviors accessible to us in this study, we chose to limit ourselves to the exploratory/descriptive aspects of analysis. The reasons for this are several. In the absence of detailed information about requesters' age, authority position in the hospitals where we taped the interviews, or previous interactions between requesters and participating librarians, we felt limited in pursuing analysis along the power dimension à la Mehrabian. The

nature of the interview was professional, as opposed to personal dyad, so that we saw little justification for analysis focusing on the emotional attraction-dislike dimension. Therefore, we saw the best promise in staying close to the primary goal of the overall project -- evaluation of the presearch interview. Thus, we saw the goal of our analysis directed at two lines of description: (1) nonverbal behaviors that indicated hindrance or facilitation of the smooth interaction flow of the interview, and (2) relationships between these behaviors and assessments of satisfaction by requesters and librarians in the interviews.

II. Procedures

Interview selection

We selected 39 interviews for nonverbal analysis in keeping with several criteria. First, we sought overlap with the data included in basic task analysis and for verbal/linguistic analysis. Therefore, we included all interviews listed in common by the task analyst and the verbal analyst -- Cochrane and Crouch. Second, we wished to explore contrasts that might exist between interviews incorporating the use of terminal and those which did not. Therefore, we included all interviews using the terminal with the exception of those found to have special problems, such as missing satisfaction measures for either interactant. Third, we wished to explore discrepancies between groups of interviews which yielded contrasting satisfaction assessments.

Nonverbal variables selection and coding

We reasoned that the interactive or relational climate during the interviews is likely to manifest itself through some nonverbal behaviors and in turn filter down to some of the satisfaction measures given at the end of the interview by either interactant. Accordingly, we selected nonverbal behaviors previously associated with positive/negative feedback during interaction. These were: eye contact, smiles, nods, and laughter. Also, we monitored adaptors associated with discomfort or stress such as body adaptors, object adaptors, and shifts. Hand gestures, as expressive adjuncts to interaction, were also included.

In addition, we monitored interruptions and periods of idleness as possible indicators of interactive disruptions. Given sitting arrangements, only upper torso was visible, including the hands. All measures were simple counts recorded at one-minute intervals and then cumulated for the entire interview.

Taking into account the nature of our data we included in our analysis the subset of satisfaction measures obtained from librarians and requesters which related to the interactive climate during the interview and thus appeared most relevant to our exploration. The satisfaction measures used are listed in Appendix 1.

The coding process took 2½ weeks. Each taped interview was viewed and coded in one-minute segments -- once for librarian, once for requester. Entire interviews, or portions of interviews which presented problems due to bad visual quality of the taping were done once over again. The sound was left on softly to verify the precision of the one-minute intervals we used. Intercoder reliability was achieved by a one-day practice session which ironed out procedural details, code perception, and definitional agreements. This was followed by another one-day practice run to detect remaining differences in behavior definitions or interpretations. Another check on coding agreement was done a week later by coding the same interview independently and comparing codes for both librarian and requester. After taking various interview durations into account, intercoder reliability ran from perfect overlap to two code discrepancies for ten minutes of interaction, which was the average interview length.

Coding definitions (13 variables)

The above mentioned interactive nonverbal behaviors and other related variables were defined and coded as follows: shared laughter, shared smile, eye contact, when performed simultaneously or reciprocally by librarian and requester. When not reciprocated, they were coded as: laugh, smile, and look alone. Nods and hand gestures were coded as they occured; hand gestures were defined as "illustrators," i.e., circular/wave motion with one or both hands, not touching objects or self. Body adaptors were coded as hand touch on self (chin, glasses, torso, etc.); object adaptors were coded as hand touch on objects external to self (table, pencil, etc.). Careful distinction was made between these and functional manipulation of papers, pens, etc., during substantive interview interaction. Shifts were defined as major changes in body position while sitting. Interruptions were breaks introduced from the outside, i.e., walk-ins or phone calls. Idleness was any 10-second or more period during which the librarian or requester was not involved interactionally or with a task related to the interview. A total of 13 variables was coded.

III. Results

Descriptive statistics

The interview lengths varied between 2 and 34 minutes, though for the most part (80%), interviews did not exceed 15 minutes (see Table 1).

Table 1. Interview Length

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
2	2	5.1	5.1	9	2	5.1	56.4	17	1	2.6	84.6
3	4	10.3	15.4	10	3	7.7	64.1	18	1	2.6	87.2
4	4	10.3	25.6	11	3	7.7	71.8	20	2	5.1	92.3
5	4	10.3	35.9	13	2	5.1	76.9	25	1	2.6	94.9
6	4	10.3	46.2	14	1	2.6	79.5	27	1	2.6	97.4
7	2	5.1	51.3	16	1	2.6	82.1	34	MAX 1	2.6	100.0

N	39
MEAN	9.94872
STD DEV	7.48313
SKEWNESS	1.42713
KURTOSIS	1.90979
VARIANCE	55.9973

RANGE	32
Q3-Q1	5
MODE	3

QUANTILES

100% MAX	34
75% Q3	13
50% MED	7
25% Q1	4
0% MIN	2

Most interviews (n=32, 82%) did not involve use of terminals, but we kept the remaining 7 (18%) where terminals were involved for later comparisons if needed. Interruptions varied, and while one interview was interrupted as many as four times, for the most part interviews went without disruptions (61.5%). See Table 2.

Table 2. Interruptions

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	24	61.5	61.5	2	1	2.6	94.9	4	1	2.6	100.0
1	12	30.8	92.3	3	1	2.6	97.4				

N	39		
MEAN	0.538462		
STD DEV	0.883955	VARIANCE	0.781377
SKEWNESS	2.28696	KURTOSIS	6.20828

RANGE	4
Q3-Q1	1
MODE	0

The knowledge and experience of the requesters varied. Requester experience was measured as the number of previous computer searches submitted; knowledge was requester self-rating on familiarity with the literature on the topic of the search executed during this interview (new field; a little knowledge; somewhat knowledgeable; quite knowledgeable). As Tables 3 and 4 indicate, the majority of requesters were above aberage in terms of experience and knowledge. Most librarians were female (82%) while more requesters (59%) were male. Indications as to librarian experience can be found in the main report.

Table 3. Requester Experience (Number of Searches)

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	9	23.1	23.1	2	9	23.1	61.5
1	6	15.4	38.5	3	15	38.5	100.0

N	39	RANGE	3
MEAN	1.76923	Q3-Q1	2
STD DEV	1.20222	MODE	3
SKEWNESS	-0.391053	VARIANCE	1.44534
		KURTOSIS	-1.41209

Table 4. Requester Knowledge

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
New field	1	6	15.4	15.4	somewhat knowl. 3	17	43.6	82.1
a little knowledge	2	9	23.1	38.5	quite knowledgable 4	7	17.9	100.0

N	39	RANGE	3
MEAN	2.641031	Q3-Q1	1
STD DEV	0.959363	MODE	3
SKEWNESS	-0.330833		
VARIANCE	0.920378		
KURTOSIS	-0.734904		

Starting with reciprocated behaviors, presented below are descriptive profiles of the interaction; data are shown side by side for librarians and requesters for all other variables.

It appears that, for the most part, little laughter or smiles were exchanged between interactants (see Tables 5 and 6). However, eye contact was steady (Table 7), as further indicated by the comparison with the distribution on interview length in minutes (Table 1) and a correlation of .78 ($p < .0001$). We calculated the correlations with interview length in order to check on the possibilities of monatonic relationship with various nonverbal behaviors.

Table 5. Shared Laughter (Correlation w/ interv. length .11, n.s.)

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	25	64.1	64.1	2	4	10.3	97.4
1	9	23.1	87.2	5	1	2.6	100.0

N	39	RANGE	5
MEAN	0.564103	Q3-Q1	1
STD DEV	0.994587	MODE	0
SKEWNESS	2.68927		
VARIANCE	0.989204		
KURTOSIS	9.56855		

Table 6. Shared Smiles (Corr. with interv. length .50, $p < .001$)

VALUE	COUNT	PERCENTS CELL	PERCENTS CUM	VALUE	COUNT	PERCENTS CELL	PERCENTS CUM
0	16	41.0	41.0	2	7	17.9	97.4
1	15	38.5	79.5	3	1	2.6	100.0

N	39			RANGE	3
MEAN	0.820513			Q3-Q1	1
STD DEV	0.823081	VARIANCE	0.677463	MODE	0
SKEWNESS	0.651037	KURTOSIS	-0.335183		

Table 7. Eye Contact (Corr. with interview length .78, $p < .0001$)

VALUE	COUNT	PERCENTS CELL	CUM	VALUE	COUNT	PERCENTS CELL	CUM	VALUE	COUNT	PERCENTS CELL	CUM
1	1	2.6	2.6	11	3	7.7	46.2	34	1	2.6	82.1
2	1	2.6	5.1	12	2	5.1	51.3	38	1	2.6	84.6
3	3	7.7	12.8	13	2	5.1	56.4	45	1	2.6	87.2
4	1	2.6	15.4	15	1	2.6	59.0	46	1	2.6	89.7
5	1	2.6	17.9	17	1	2.6	61.5	57	1	2.6	92.3
6	2	5.1	23.1	19	1	2.6	64.1	60	1	2.6	94.9
7	2	5.1	28.2	20	4	10.3	74.4	63	1	2.6	97.4
8	3	7.7	35.9	28	1	2.6	76.9	78	1	2.6	100.0
9	1	2.6	38.5	32	1	2.6	79.5				

N	39		
MEAN	19.8718		
STD DEV	19.2151	VARIANCE	369.22
SKEWNESS	1.49876	KURTOSIS	1.54673
		RANGE	77
		Q3-Q1	21
		MODE	20

QUANTILES	
100% MAX	78
75% Q3	28
50% MED	12
25% Q1	7
0% MIN	1

As with reciprocated behaviors, the librarians and requesters laughed or smiled very little in isolation, though it appears that librarians offered more unreciprocated smiles (see Tables 8 and 9).

Table 8. Laugh Alone

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	27	69.2	69.2
1	3	7.7	76.9
2	7	17.9	94.9
3	1	2.6	97.4
4	1	2.6	100.0

N	39
MEAN	0.615385
STD DEV	1.04164
SKEWNESS	1.59019
VARIANCE	1.08502
KURTOSIS	1.80648

QUANTILES	
100% MAX	4
75% Q3	1
50% MED	0
25% Q1	0
0% MIN	0
RANGE	4
Q3-Q1	1
MODE	0

(Corr. w/ interview length .55, $p < .0003$)

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	33	84.6	84.6
1	3	7.7	92.3
2	1	2.6	94.9
3	1	2.6	97.4
4	1	2.6	100.0

N	39
MEAN	0.307692
STD DEV	0.863099
SKEWNESS	3.22415
VARIANCE	0.744939
KURTOSIS	10.4986

QUANTILES	
100% MAX	4
75% Q3	0
50% MED	0
25% Q1	0
0% MIN	0
RANGE	4
Q3-Q1	0
MODE	0

(Corr. w/ interview length .31, $p < .05$)

Table 9. Smile Alone

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	14	35.9	35.9
1	11	28.2	64.1
2	5	12.8	76.9
3	4	10.3	87.2
5	2	5.1	92.3
8	1	2.6	94.9
11	1	2.6	97.4
12	1	2.6	100.0

N	39
MEAN	1.89744
STD DEV	2.83581
SKEWNESS	2.40109
VARIANCE	8.04184
KURTOSIS	5.82572

QUANTILES	
100% MAX	12
75% Q3	2
50% MED	1
25% Q1	0
0% MIN	0
RANGE	12
Q3-Q1	2
MODE	0

(Corr. w/ interview length .56, $p < .0002$)

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	21	53.8	53.8
1	9	23.1	76.9
2	5	12.8	89.7
3	2	5.1	94.9
4	2	5.1	100.0

N	39
MEAN	0.846154
STD DEV	1.15937
SKEWNESS	1.28334
VARIANCE	1.34413
KURTOSIS	1.19248

QUANTILES	
100% MAX	4
75% Q3	1
50% MED	0
25% Q1	0
0% MIN	0
RANGE	4
Q3-Q1	1
MODE	0

(Corr. w/ interview length -.07, n.s.)

Further, the data indicate a steady flow of glances without locking into eye contact, though librarians tended to glance more at the requester (see Table 10).

As could be expected during this kind of interview, where the librarian generally guides the situation, provides explanations, or asks various questions, the librarians used more illustrative gestures, while the requesters nodded frequently (see Tables 11 and 12).

Requesters shifted positions in the chairs and also displayed more body adaptors than librarians (see Tables 13 and 15).

Table 10. Look Alone

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	5	12.8	12.8
1	4	10.3	23.1
2	1	2.6	25.6
3	2	5.1	30.8
4	1	2.6	33.3
5	2	5.1	38.5
6	2	5.1	43.6
7	2	5.1	48.7
8	2	5.1	53.8
9	1	2.6	56.4
11	1	2.6	59.0
12	2	5.1	64.1
15	1	2.6	66.7
16	2	5.1	71.8
19	2	5.1	76.9
21	1	2.6	79.5
22	3	7.7	87.2
24	1	2.6	89.7
27	1	2.6	92.3
28	1	2.6	94.9
29	2	5.1	100.0

N	39
MEAN	10.7949
STD DEV	9.53989
SKEWNESS	0.565761
VARIANCE	91.0094
KURTOSIS	-1.02059

QUANTILES	
100% MAX	29
75% Q3	19
50% MED	8
25% Q1	2
0% MIN	0
RANGE	29
Q3-Q1	17
MODE	0

(Corr. w/ interview length .79, $p < .0001$)

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	3	7.7	7.7
1	1	2.6	10.3
2	6	15.4	25.6
3	3	7.7	33.3
4	4	10.3	43.6
5	1	2.6	46.2
6	2	5.1	51.3
7	3	7.7	59.0
8	4	10.3	69.2
9	3	7.7	76.9
12	1	2.6	79.5
14	4	10.3	89.7
15	1	2.6	92.3
18	1	2.6	94.9
27	1	2.6	97.4
32	1	2.6	100.0

N	39
MEAN	7.56411
STD DEV	6.99171
SKEWNESS	1.74793
VARIANCE	48.8839
KURTOSIS	3.72341

QUANTILES	
100% MAX	32
75% Q3	9
50% MED	6
25% Q1	2
0% MIN	0
RANGE	32
Q3-Q1	7
MODE	2

(Corr. w/ interview length .68, $p < .0001$)

Table 11. Nods

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	2	5.1	5.1
1	3	7.7	12.8
2	3	7.7	20.5
4	2	5.1	25.6
5	3	7.7	33.3
6	3	7.7	41.0
7	4	10.3	51.3
8	3	7.7	59.0
10	1	2.6	61.5
11	1	2.6	64.1
12	2	5.1	69.2
13	1	2.6	71.8
14	1	2.6	74.4
15	1	2.6	76.9
16	1	2.6	79.5
17	1	2.6	82.1
23	1	2.6	84.6
31	1	2.6	87.2
37	1	2.6	89.7
54	1	2.6	92.3
64	1	2.6	94.9
67	1	2.6	97.4
134	1	2.6	100.0

N	39
MEAN	16.2051
STD DEV	25.3067
SKEWNESS	3.24701
VARIANCE	640.43
KURTOSIS	12.3232

QUANTILES	
100% MAX	134
75% Q3	15
50% MED	7
25% Q1	4
0% MIN	0
RANGE	134
Q3-Q1	11
MODE	7

(Corr. w/ interview length .47, $p < .002$)

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	2	5.1	5.1
1	2	5.1	10.3
2	2	5.1	15.4
3	1	2.6	17.9
4	2	5.1	23.1
5	1	2.6	25.6
8	4	10.3	35.9
9	1	2.6	38.5
10	1	2.6	41.0
11	1	2.6	43.6
12	1	2.6	46.2
13	1	2.6	48.7
14	1	2.6	51.3
15	1	2.6	53.8
16	1	2.6	56.4
17	1	2.6	59.0
18	2	5.1	64.1
20	1	2.6	66.7
24	2	5.1	71.8
29	1	2.6	74.4
30	1	2.6	76.9
37	1	2.6	79.5
41	1	2.6	82.1
42	1	2.6	84.6
43	1	2.6	87.2
51	1	2.6	89.7
62	1	2.6	92.3
67	1	2.6	94.9
101	1	2.6	97.4
223	1	2.6	100.0

N	39
MEAN	26.4359
STD DEV	40.0807
SKEWNESS	3.54889
VARIANCE	1606.46
KURTOSIS	15.3194

QUANTILES	
100% MAX	223
75% Q3	30
50% MED	14
25% Q1	5
0% MIN	0
RANGE	223
Q3-Q1	25
MODE	8

(Corr. w/ interview length .70, $p < .0001$)

Table 12. Gesturing

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	1	2.6	2.6
2	2	5.1	7.7
9	3	7.7	15.4
14	1	2.6	17.9
15	1	2.6	20.5
17	3	7.7	28.2
20	3	7.7	35.9
21	1	2.6	38.5
22	1	2.6	41.0
23	1	2.6	43.6
29	1	2.6	46.2
30	1	2.6	48.7
31	1	2.6	51.3
33	1	2.6	53.8
37	1	2.6	56.4
38	1	2.6	59.0
42	1	2.6	61.5
45	1	2.6	64.1
51	1	2.6	66.7
52	1	2.6	69.2
66	1	2.6	71.8
68	1	2.6	74.4
69	1	2.6	76.9
70	1	2.6	79.5
73	2	5.1	84.6
74	1	2.6	87.2
116	1	2.6	89.7
117	1	2.6	92.3
119	1	2.6	94.9
130	1	2.6	97.4
140	1	2.6	100.0

N	39
MEAN	44.6154
STD DEV	37.9893
SKEWNESS	1.10385
VARIANCE	1443.19
KURTOSIS	0.360161

QUANTILES	
100% MAX	140
75% Q3	69
50% MED	31
25% Q1	17
0% MIN	0
RANGE	140
Q3-Q1	52
MODE	9

(Corr. w/ interview length .69, $p < .0001$)

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
1	2	5.1	5.1
2	1	2.6	7.7
5	3	7.7	15.4
6	1	2.6	17.9
7	2	5.1	23.1
8	2	5.1	28.2
9	1	2.6	30.8
10	1	2.6	33.3
13	2	5.1	38.5
14	1	2.6	41.0
15	1	2.6	43.6
16	1	2.6	46.2
17	1	2.6	48.7
19	1	2.6	51.3
21	1	2.6	53.8
23	2	5.1	59.0
26	2	5.1	64.1
32	2	5.1	69.2
34	2	5.1	74.4
37	1	2.6	76.9
47	1	2.6	79.5
60	1	2.6	82.1
67	1	2.6	84.6
74	1	2.6	87.2
78	1	2.6	89.7
92	1	2.6	92.3
98	1	2.6	94.9
175	1	2.6	97.4
336	1	2.6	100.0

MEAN	38.359
STD DEV	60.0068
SKEWNESS	3.70479
VARIANCE	3600.82
KURTOSIS	16.3358

QUANTILES	
100% MAX	336
75% Q3	37
50% MED	19
25% Q1	8
0% MIN	1
RANGE	335
Q3-Q1	29
MODE	5

(Corr. w/ interview length .67, $p < .0001$)

Table 13. Adaptors (Body)

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
1	1	2.6	2.6
2	5	12.8	15.4
4	2	5.1	20.5
5	3	7.7	28.2
6	1	2.6	30.8
7	1	2.6	33.3
8	6	15.4	48.7
11	1	2.6	51.3
12	1	2.6	53.8
13	2	5.1	59.0
14	1	2.6	61.5
18	1	2.6	64.1
25	1	2.6	66.7
26	1	2.6	69.2
27	2	5.1	74.4
28	1	2.6	76.9
30	1	2.6	79.5
32	1	2.6	82.1
37	1	2.6	84.6
43	1	2.6	87.2
52	1	2.6	89.7
54	1	2.6	92.3
56	1	2.6	94.9
60	1	2.6	97.4
89	1	2.6	100.0

N	39
MEAN	20.0513
STD DEV	21.6442
SKEWNESS	1.66886
VARIANCE	468.471
KURTOSIS	2.52203

QUANTILES

100% MAX	89
75% Q3	28
50% MED	11
25% Q1	5
0% MIN	1
RANGE	88
Q3-Q1	23
MODE	8

(Corr. w/ interview length .72, $p < .0001$)

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	3	7.7	7.7
1	2	5.1	12.8
2	2	5.1	17.9
3	3	7.7	25.6
4	3	7.7	33.3
8	1	2.6	35.9
9	1	2.6	38.5
10	1	2.6	41.0
14	1	2.6	43.6
16	2	5.1	48.7
18	1	2.6	51.3
19	2	5.1	56.4
21	1	2.6	59.0
23	1	2.6	61.5
24	1	2.6	64.1
25	1	2.6	66.7
29	1	2.6	69.2
41	1	2.6	71.8
43	1	2.6	74.4
44	1	2.6	76.9
46	1	2.6	79.5
47	1	2.6	82.1
49	1	2.6	84.6
53	1	2.6	87.2
59	1	2.6	89.7
62	2	5.1	94.9
66	1	2.6	97.4
158	1	2.6	100.0

N	39
MEAN	25.8462
STD DEV	30.1457
SKEWNESS	2.40211
VARIANCE	908.765
KURTOSIS	8.62362

QUANTILES

100% MAX	158
75% Q3	44
50% MED	18
25% Q1	3
0% MIN	0
RANGE	158
Q3-Q1	41
MODE	0

(Corr. w/ interview length .69, $p < .0001$)

Requesters also resorted to more object adaptors (see Table 14). Further analysis would indicate whether indeed this reveals more discomfort on the part of the requesters. Let us note in the meantime that librarians, involved in a task situation, had less opportunity to exhibit adaptors, while requesters' motility would be more easily displayed since they are listeners in the interaction.

Table 14. Adaptors (Object)

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
2	2	5.1	5.1
3	2	5.1	10.3
4	1	2.6	12.8
5	3	7.7	20.5
6	2	5.1	25.6
7	2	5.1	30.8
9	1	2.6	33.3
10	3	7.7	41.0
11	1	2.6	43.6
13	1	2.6	46.2
14	2	5.1	51.3
15	3	7.7	59.0
18	1	2.6	61.5
19	1	2.6	64.1
23	1	2.6	66.7
24	2	5.1	71.8
28	1	2.6	74.4
32	1	2.6	76.9
33	1	2.6	79.5
34	1	2.6	82.1
37	1	2.6	84.6
38	1	2.6	87.2
42	1	2.6	89.7
49	1	2.6	92.3
59	1	2.6	94.5
66	1	2.6	97.4
108	1	2.6	100.0

N	39
MEAN	21.1538
STD DEV	21.4421
SKEWNESS	2.19157
VARIANCE	459.765
KURTOSIS	6.22997

QUANTILES	
100% MAX	108
75% Q3	32
50% MED	14
25% Q1	6
0% MIN	2
RANGE	106
Q3-Q1	26
MODE	5

(Corr. w/ interview length n.s.)

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	2	5.1	5.1
1	4	10.3	15.4
2	2	5.1	20.5
3	3	7.7	28.2
4	2	5.1	33.3
5	3	7.7	41.0
6	1	2.6	43.6
7	3	7.7	51.3
8	1	2.6	53.8
14	2	5.1	59.0
15	2	5.1	64.1
17	2	5.1	69.2
30	1	2.6	71.8
33	1	2.6	74.4
34	2	5.1	79.5
41	2	5.1	84.6
48	1	2.6	87.2
59	1	2.6	89.7
65	1	2.6	92.3
124	1	2.6	94.9
178	1	2.6	97.4
239	1	2.6	100.0

N	39
MEAN	28.0256
STD DEV	49.4802
SKEWNESS	3.07102
VARIANCE	2448.29
KURTOSIS	10.0291

QUANTILES(D)	
100% MAX	239
75% Q3	34
50% MED	7
25% Q1	3
0% MIN	0
RANGE	239
Q3-Q1	31
MODE	1

(Corr. n.s.)

Table 15. Shifts

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	9	23.1	23.1
1	10	25.6	48.7
2	3	7.7	56.4
3	8	20.5	76.9
4	3	7.7	84.6
7	2	5.1	89.7
10	1	2.6	92.3
13	2	5.1	97.4
24	1	2.6	100.0

N	39
MEAN	3.230771
STD DEV	4.72096
SKEWNESS	2.85301
VARIANCE	22.2874
KURTOSIS	9.65515

QUANTILES	
100% MAX	24
75% Q3	3
50% MED	2
25% Q1	1
0% MIN	0
RANGE	24
Q3-Q1	2
MODE	1

(Corr. w/ interview length .52, $p < .0007$)

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	3	7.7	7.7
1	4	10.3	17.9
2	4	10.3	28.2
3	5	12.8	41.0
4	3	7.7	48.7
5	2	5.1	53.8
8	3	7.7	61.5
9	2	5.1	66.7
10	1	2.6	69.2
11	1	2.6	71.8
12	1	2.6	74.4
13	2	5.1	79.5
14	1	2.6	82.1
15	1	2.6	84.6
16	1	2.6	87.2
20	1	2.6	89.7
22	1	2.6	92.3
25	1	2.6	94.9
29	1	2.6	97.4
41	1	2.6	100.0

N	39
MEAN	8.51282
STD DEV	9.03465
SKEWNESS	1.75223
VARIANCE	81.6248
KURTOSIS	3.51606

QUANTILES	
100% MAX	41
75% Q3	13
50% MED	5
25% Q1	2
0% MIN	0
RANGE	41
Q3-Q1	11
MODE	3

(Corr. w/ interview length .82, $p < .0001$)

The nature of the interactive situation did not allow much idleness on the part of the librarians, while such a "pause" occurred for requesters in half the cases (see Table 16), even

twice for the most part. It is interesting to note that in seven out of ten occurrences for librarians (see Table 17), idle pauses occured at the very start of the interview, probably while getting the process underway. In contrast, requesters were left idle predominantly in the middle or latter part of the interview, probably while librarians searched for answers and were unable to keep the requester "engaged."

Table 16. Idleness

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	29	74.4	74.4
ONCE 1	6	15.4	89.7
TWICE 2	4	10.3	100.0

N	39
MEAN	0.358974
STD DEV	0.668351
SKEWNESS	1.66457
VARIANCE	0.446694
KURTOSIS	1.45924
RANGE	2
Q3-Q1	1
MODE	0

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	18	46.2	46.2
1	5	12.8	59.0
2	16	41.0	100.0

N	39
MEAN	0.948718
STD DEV	0.944478
SKEWNESS	0.106022
VARIANCE	0.892038
KURTOSIS	-1.93051
RANGE	2
Q3-Q1	2
MODE	0

Table 17. Type of Idleness (Place of occurrence during interview)

Librarians

	VALUE	COUNT	PERCENTS CELL	CUM
	0	29	74.4	74.4
ONCE, At start	1	3	7.7	82.1
In Middle	2	1	2.6	84.6
In Middle	3	1	2.6	87.2
In Middle	4	1	2.6	89.7
Part in Middle	12	3	7.7	97.4
Start in Middle	14	1	2.6	100.0

Requesters

	VALUE	COUNT	PERCENTS CELL	CUM
	0	18	46.2	46.2
ONCE, At start	1	1	2.6	48.7
In Middle	2	3	7.7	56.4
In Middle	3	1	2.6	59.0
Start in Middle	12	2	5.1	64.1
In Middle	13	1	2.6	66.7
In Middle	14	1	2.6	69.2
In Middle	23	7	17.9	87.2
In Middle	24	2	5.1	92.3
In Middle	34	3	7.7	100.0

We collected the above information on idleness for two reasons. We assumed that the skill of the librarian in keeping requesters involved in the interaction would reduce their impatience and possibly enhance some aspects of requester satisfaction. We also wanted to check whether requester discomfort during idle periods would be manifested in increased overall motility for requesters.

We isolated for comparison the totals of all nonverbal activity ("total motility") occurring during idle periods. It appears that, when idle, librarians were more mobile than requesters (see Table 18). Thus it will appear that librarians were less patient during pauses that left them unoccupied. We further compared the average rate of activity during idleness to the overall motility mean during interviews, which was 12.71 for librarians and 14.29 for requesters. While motility during idleness increased sharply during idle periods, for both interactants, it still seems that the discrepancy is more pronounced for the librarians. Thus, it turns out that librarian impatience during idleness was higher than requesters', running contrary to our initial expectations.

Analysis of first interviews for each librarian

We were concerned with possible bias that could be associated with the first interview a librarian conducted for videotaping by our team. Our initial intent was to exclude all first interviews (n=13) as a simple way of obviating the expected problem. For example, we expected that most outliers (extreme scores in various nonverbal areas) would appear in these first interviews. We thus

Table 18. Idle Activity (Total motility index)

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	13	33.3	33.3
7	1	2.6	35.9
9	3	7.7	43.6
10	1	2.6	46.2
12	1	2.6	48.7
14	1	2.6	51.3
16	1	2.6	53.8
17	1	2.6	56.4
19	1	2.6	59.0
20	1	2.6	61.5
21	1	2.6	64.1
22	1	2.6	66.7
23	1	2.6	69.2
26	1	2.6	71.8
27	1	2.6	74.4
29	1	2.6	76.9
31	2	5.1	82.1
32	1	2.6	84.6
38	1	2.6	87.2
43	1	2.6	89.7
47	2	5.1	94.9
224	1	2.6	97.4
234	1	2.6	100.0

N	39
MEAN	X 26.0769 X
STD DEV	49.9491
SKEWNESS	3.67352
VARIANCE	2494.91
KURTOSIS	13.6349

	QUANTILES
100% MAX	234
75% Q3	29
50% MED	14
25% Q1	0
0% MIN	0
RANGE	234
Q3-Q1	29
MODE	0

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	13	33.3	33.3
2	1	2.6	35.9
5	2	5.1	41.0
6	1	2.6	43.6
10	2	5.1	48.7
13	1	2.6	51.3
15	3	7.7	59.0
16	1	2.6	61.5
17	3	7.7	69.2
18	2	5.1	74.4
20	1	2.6	76.9
26	1	2.6	79.5
28	1	2.6	82.1
30	1	2.6	84.6
38	1	2.6	87.2
43	1	2.6	89.7
44	1	2.6	92.3
78	1	2.6	94.9
88	1	2.6	97.4
188	1	2.6	100.0

N	39
MEAN	20.0513 X
STD DEV	34.1767
SKEWNESS	3.5824
VARIANCE	1168.05
KURTOSIS	15.5271

	QUANTILES
100% MAX	188
75% Q3	20
50% MED	13
25% Q1	0
0% MIN	0
RANGE	188
Q3-Q1	20
MODE	0

ran a check on the descriptive profiles which enabled us to compare, for each variable, the data on all 39 interviews vs. 26 interviews when the "firsts" were excluded, as well as the profile of the 13 firsts alone. As a result, we found that "idle activity" by librarians and requesters indicated a change (see Appendix 2,

Table 2M). The idle activity average when "firsts" are excluded is 16.19 for librarians and 20.57 for requesters. However, the average idle activity of librarians and requesters during first interviews leaps to 27.76 and 37.07, respectively. In brief, it appears that during idle periods occurring in first interviews, both librarians and requesters were much more animated, compared to subsequent interviews.

Other than that, we did not find significant discrepancies, contrary to our expectations. For example, we found only one outlier (score of 140 on gestures) and a slight tendency for librarians to laugh alone more when first were excluded from the averages. Whether the lack of contrasts here is attributable to user and librarian experience in most cases is not clear; the small n for first interviews (n=13) and the modest overall n precludes much further analysis. For this reason we decided to leave in the "firsts" and work with the total group of 39 interviews as initially selected.

Appendix 2 includes a number of tables with descriptive data on first interviews (n=13) and non-first interviews (n=26) for librarians and for requesters (compare with profiles on all 39, Tables 1 through 18).

Further, while pondering the outliers again, we ran parallel correlations (simple and partial, controlling for interview length) for pairs of interactants in each interview, variable by variable. Our reasoning was that a mutual activation loop was possible, whereby one overactive interview participant may stimulate corresponding activity in the other person. Indeed, we found such

indication in the case of self adaptors (touch) but no strong relationships for any of the rest. The partial correlation (controlling for interview length) between librarian and requester self adaptors was .54 (.0001). However, touch adaptors were not the category where most outliers occurred. Appendix 3 includes the paired data for this analysis.

With regard to outliers, a different possibility emerged upon further examination of the partial correlation matrix and also the pairs of scores in Appendix 3. All outliers (with the exception of 178* on requester object adaptors and 116* librarian gestures) occur together in the same interview, committed by the same person, suggesting self-activating loops. The outliers were paired by interview, as follows:

Table 19. Paired Outliers in Same Interview

	Librarians				Requesters				
Gestures	117	119	116*	140	336	175	130		
Nods		134		64		223	101		
Object Adaptors	108				239			124	178*
Touch Adaptors								158	

Given the above, we are inclined to view these outliers as the result of self-activation loops occuring during the interview and peculiar to the individuals involved. Essentially, we have nine interviews during which either the librarian or the requester

displayed agitation. The nature of the nonverbal behaviors is mixed and therefore we cannot interpret it as negative agitation or discomfort. Gestures and nods, for example, are positive concomitants of interaction. The partial correlation coefficients in Table 20 give further credence to the possibility of self-activation loops, beyond outliers, but rather in bunching of certain behaviors occurring together. Examples of that would be the .64 coefficient between librarian object adaptors and gestures, or the .565 correlation between these same behaviors in requesters. The negative relationship between requesters' adaptors (touch and object) and nods underscores the role of nods as indicators of positive interaction in contrast to adaptors which are negative indicators. The same goes for the positive relationship between librarian shifts and touch adaptors as both tend to be negative. The relationship between requester nods and shifts appears to cast the shifts in a positive light -- possibly in that such shifts occurred often when requesters approached the librarian to follow the search more closely, rather than having much to do with requester discomfort.

Table 20. Partial Correlation Coefficients Between Requesters' Own and Librarians' Own Nonverbal Behaviors (controlled for interview length)

		Requesters	
		Nods	Gestures
Requesters	Touch adapt.	-.581 (.0001)	
	Object adapt.	-.522 (.0008)	.565 (.0002)
	Shifts	.379 (.01)	

		Librarians		
		Nods	Object Adapt.	Touch Adapt.
Librarians	Gestures	.326 (.04)	.647 (.0001)	
	Shifts			.5511 (.0003)

(p values in parentheses)

Terminal use in interviews

After looking into the first interviews as a group, we also singled out the group of interviews during which the terminal was in use. The reason to explore their cases was to see if any changes occurred due to the interposed terminal, affecting in turn the participants behaviors. The small size of this group (n=7) should alert the reader to possible instability in these results, however pronounced. We compared the means of the seven interviews to the rest.

As could well be expected, the use of the terminal (with the librarians' attention devoted to it for part of the interaction) did have an effect on requesters. They looked at the librarian more without reciprocation (.05), nodded much less (.008), gestured less (.05), and displayed more object and touch adaptors (.05 and .0006 respectively) than they did on the average during "non-terminal" interviews, possibly while waiting or watching the librarian manipulate the terminal (see Table 21). Now, all the above nonverbal indicators in requester behaviors would suggest discomfort on the face of it. Interestingly enough, the "terminal interview" requesters were the happiest requesters, as they scored highest satisfaction in all respects, as Table 25 clearly indicates. Evidently, the context involving the technological "toy" changed the nature of the interaction enough to neutralize what these nonverbal behaviors do usually indicate. The only other possibility is that the search results requesters got from interviews with terminals were superior to results from searches not so aided. Excellent search outcome may have then neutralized any awkwardness

Table 21. Terminal Use and Requesters' Activity

VARIABLE: LOOKALONE

TERMINAL	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	7.34375000	7.57163371	1.33848839	UNEQUAL	-0.6563	20.8
1	7	8.57142857	3.45722157	1.30670693	EQUAL	-0.4162	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 4.80 WITH 31 AND 6 DF PROB > F'= 0.0571 ✓

VARIABLE: NODS

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	27.87500000	43.82277358	7.74684509	UNEQUAL	0.8585	31.8
1	7	19.85714286	13.80131119	5.21640531	EQUAL	0.4745	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 10.08 WITH 31 AND 6 DF PROB > F'= 0.0081 ✓

VARIABLE: TOUCH ADAPTORS

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	19.62500000	20.31962344	3.59203588	UNEQUAL	-1.8115	6.4
1	7	54.28571429	49.72160592	18.79300058	EQUAL	-3.0396	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 5.99 WITH 6 AND 31 DF PROB > F'= 0.0006 ✓

VARIABLE: OBJECTADAPTORS

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	23.81250000	43.30941751	7.65609570	UNEQUAL	-0.8228	7.0
1	7	47.28571429	72.71339694	27.48308076	EQUAL	-1.1415	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 2.82 WITH 6 AND 31 DF PROB > F'= 0.0525 ✓

VARIABLE: GESTURES

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	39.43750000	65.11673760	11.51112168	UNEQUAL	0.3757	21.1
1	7	33.42857143	29.37605115	11.10310369	EQUAL	0.2370	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 4.91 WITH 31 AND 6 DF PROB > F'= 0.0538 ✓

22

they would have experienced during the interview process. It is unfortunate that we do not have information as to the comparable merits of search outcomes to verify the above.

Where librarians were concerned, the terminal apparently introduced a certain lack of "synch" -- they smiled alone a lot more (.03), used a lot of touch adaptors (.05), but much fewer object adaptors (.03) than in the rest of the interviews, possibly due to discomfort. The satisfaction data which we present later seem to bear this out. See Table 22 for librarian behaviors.

Quite predictably, during these interviews librarians stood significantly more idle than during "non-terminal" interviews (.02), while the requesters did not. Bearing in mind the increased motility reported above, it is not surprising that both librarians' and requesters' idle activity averages were significantly higher during terminal sessions, .0001 for both. Finally, we find that interviews using terminals were interrupted at least once from the outside, which is four times the rate for the rest of the interviews. We could not find any explanation for that (see Table 23).

Relation of satisfaction measures to nonverbal variables

We started the examination of satisfaction measure relationships by analyzing the entire group of 39 interviews. We looked at each of the selected satisfaction measures, for librarians and requesters, in association with each of the nonverbal and situational variables included in this study. As Table 24 indicates, several variables are associated with the way librarians as a

Table 22. Terminal Use and Librarian Behavior

VARIABLE: TOUCH

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	15.06250000	16.68481539	2.94948653	UNEQUAL	-2.5223	7.0
1	7	42.85714286	28.09168662	10.61765953	EQUAL	-3.5049	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 2.83 WITH 6 AND 31 DF PROB > F'= 0.0513

VARIABLE: OBJEC

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	22.84375000	23.02328327	4.06997993	UNEQUAL	1.7430	24.1
1	7	13.42857143	9.39604780	3.55137226	EQUAL	1.0539	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 6.00 WITH 31 AND 6 DF PROB > F'= 0.0323

VARIABLE: SMILEA

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	1.46875000	2.35528746	0.41635993	UNEQUAL	-1.4885	6.9
1	7	3.85714286	4.09994193	1.54963239	EQUAL	-2.1079	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 3.03 WITH 6 AND 31 DF PROB > F'= 0.0379

24

Table 23. Terminal Use and Idleness; and Idle Activity of Participants

VARIABLE: LIBIDLE

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	1.68750000	4.18474572	0.73976552	UNEQUAL	0.5892	24.6
1	7	1.14285714	1.67616342	0.63353022	EQUAL	0.3356	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 6.23 WITH 31 AND 6 DF PROB > F'= 0.0294 ✓

VARIABLE: USEIDLE

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	7.21875000	11.09994006	1.96221072	UNEQUAL	-2.9028	9.1
1	7	20.14285714	10.57400226	3.99659719	EQUAL	-2.8116	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 1.10 WITH 31 AND 6 DF PROB > F'= 0.9953 ✓

VARIABLE: IDLEACTIVITY - USERNAMES

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	13.12500000	17.65210396	3.12048060	UNEQUAL	-1.5339	6.2
1	7	51.71428571	66.04724139	24.96351079	EQUAL	-2.9718	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 14.00 WITH 6 AND 31 DF PROB > F'= 0.0001 ✓

VARIABLE: IDLEACTIVITY - USERS

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	13.00000000	14.63094379	2.58640989	UNEQUAL	-1.9612	6.1
1	7	85.85714286	98.05003582	37.05943012	EQUAL	-4.1879	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 44.91 WITH 6 AND 31 DF PROB > F'= 0.0001 ✓

VARIABLE: INTERRUPTIONS

TERM	N	MEAN	STD DEV	STD ERROR	VARIANCES	T	DF
0	32	0.34375000	0.54532470	0.09640070	UNEQUAL	-1.8720	6.3
1	7	1.42857143	1.51185789	0.57142857	EQUAL	-3.3023	37.0

FOR HO: VARIANCES ARE EQUAL, F'= 7.69 WITH 6 AND 31 DF PROB > F'= 0.0001 ✓

group expressed their satisfaction with the interviews. No such indicative associations emerged for the requesters as a group. It may be that for the most part requesters were relatively less concerned with the situation, while librarians as a group took the task to heart in their concern with doing a good job. Added sensitivity may have been introduced with the special situation of this study making librarians feel under scrutiny as to professionalism and skill. However, further breakdown and analysis of librarian and requester subgroups may provide finer distinctions which will be presented later in this report.

Specifically, the data presented in Table 24 can be summarized as follows. Interruptions are associated with librarians feeling ill at ease (variable 48). Requesters' isolated laughter associates with less librarian enjoyment (variable 42).

Librarians' enjoyment in working with the requesters (variable 42) seems enhanced by requesters' experience, though we note that for the most part requesters were above average in experience anyway. Both longer interviews and requesters' self adaptors (touch, scratch, etc.) are associated with librarian indication that the interview fell short of their expectation (variable 50). Maybe librarians sensing requester nervousness or feeling that the interview is dragging on longer than expected were more likely to express this sort of dissatisfaction. Finally, the librarians' own nonverbal behaviors are strongly associated with their subsequent assessment of satisfaction wit the interview in terms of variable 50. That is, librarians'

Table 24. Satisfaction Measures (n=39) and Associated Variables

Librarian Satisfaction:

	Requesters'...			Librarians'...					
	Laugh Alone	Touch	Experience	Shifts	Smile Alone	Look Alone	Touch	Interview Length	Interruptions
Var. 42	-0.321 (.04)		.310 (.05)						
Var. 48									-0.414 (.008)
Var. 50		-0.405 (.01)		-0.399 (.01)	-0.317 (.04)	-0.513 (.000)	-0.501 (.001)	-0.355 (.02)	

Reuqester Satisfaction:

	Librarian Shifts
Var. 41	-0.325 (.04)

Variables:

33/42 = I enjoyed working with the librarian/requester.

39/48 = I felt at ease during the interview.

41/50 = The interview met my expectations.

(p values in parentheses)

position shifts, self adaptors (touch), glancing at requester without reciprocation, or smiling in isolation, all correlate with their statement that the interview fell short of expectations. This may be indicative of librarians feeling that things were not going as expected during the interview. The requesters, in turn, may have also been affected, as librarian shifts correlate with lower requester satisfaction (variable 41).

Satisfaction difference between selected groups of interviews

In order to obtain a general picture in different levels of satisfaction reported by librarians and requesters, we compiled the comparison profile shown in Table 25. Here we show the mean satisfaction scores for various interview groupings as discussed previously. The satisfaction scores are given in parallel fashion for librarians and requesters, organized by each of the five satisfaction aspects of potential interest to us. The label for each such measure is workded to be consistent with the scores, where the higher the score, the higher the level of satisfaction reported. The lowest possible score was 1, the highest possible score was 7.

Glancing first across the satisfaction levels for requesters and librarians over the entire table, we notice that, in general, librarians show less satisfaction than requesters across the board; one exception is the first measure (variables 33/42 -- enjoyment of working with each other). Also, librarians show the lowest overall scores on variable 48; the felt ill at ease during interviews, but particularly during "firsts" ($\bar{X}$=2.08). Given the somewhat awkward circumstance with experimental inter-

Table 25. Comparisons of Satisfaction Averages for Interviews Grouped According to Use/Non-Use of Terminal, First/Non-First, and Overall

Requester Satisfaction				Librarian Satisfaction	
Var.33: I enjoyed working w/ the librarian.				Var.42 (...w/ the requester.)	
Group		Mean	Variance	Mean	Variance
No terminal	(n=32)	5.97	1.26	6.0	1.22
With terminal	(n=7)	6.43	.62	6.43	.28
First interviews	(n=13)	6.08	.91	6.0	1.33
Excluding firsts	(n=26)	6.04	1.32	6.11	.98
All interviews	(n=39)	6.05	1.15	6.08	1.07
Var.35: I was very satisfied w/ the interview.				Var.44 (same)	
Group		Mean	Variance	Mean	Variance
No terminal	(n=32)	6.22	2.18	5.81	2.16
With terminal	(n=7)	6.86	.14	5.28	2.57
First interviews	(n=13)	6.38	2.75	1.35	1.83
Excluding firsts	(n=26)	6.31	1.50	5.57	2.41
All interviews	(n=39)	6.33	1.86	5.72	2.21
Var.37: Generally, it was a successful interview.				Var.46 (same)	
Group		Mean	Variance	Mean	Variance
No terminal	(n=32)	6.59	.64	5.65	3.45
With terminal	(n=7)	6.71	.24	4.86	3.14
First interviews	(n=13)	6.69	.23	6.23	1.19
Excluding firsts	(n=26)	6.57	.73	5.15	4.21
All interviews	(n=39)	6.61	.56	5.51	3.41

Table 25 (con'd)

Requester Satisfaction				Librarian Satisfaction	
Var.39: I felt at ease during the interview.				Var.48 (same)	
Group		Mean	Variance	Mean	Variance
No terminal	(n=32)	5.91	2.86	4.81	4.60
With terminal	(n=7)	6.85	.14	3.43	1.62
First interviews	(n=13)	6.07	3.57	2.08	4.33
Excluding firsts	(n=26)	6.07	2.07	4.84	4.21
All interviews	(n=39)	6.07	2.49	4.56	4.30
Var.41: The interview met my expectations.				Var.50 (same)	
Group		Mean	Variance	Mean	Variance
No terminal	(n=32)	5.94	2.18	5.19	4.15
With terminal	(n=7)	5.86	3.14	3.71	3.90
First interviews	(n=13)	5.38	3.25	4.54	4.27
Excluding firsts	(n=26)	6.19	1.68	5.11	4.43
All interviews	(n=39)	5.92	2.28	4.92	4.33

vention (taping, etc.), this is hardly surprising. The professionals felt scrutinized, a pressure not shared by requesters. Apparently, librarians found little relief in the use of terminals, as indicated by their low scores for terminal interviews (n=7) related both to variables 48 and 50. But the lowest score of 1.35 (very little satisfaction with the interview in general, variable 44) appears for first interviews again (n=13). None of of these considerable fluctuations occur for requesters. However, it is worth noting that in four out of five satisfaction categories (variables 33, 35, 37, and 39) requesters participat-

ing in interviews involving the terminal (n=7) show the highest satisfactions, whether compared to the total average (n=39) or any other group. The exception is variable 41, where the highest mean is for non-first interviews (n=26), the lowest for first interviews (n=13). We are inclined to treat this as predictable. Variable 41 is general, asking how the interview met their expectations. While these expectations may or may not have included use of a terminal, most likely requesters were sensitive to librarian ease or poise, or the lack of it. That ease aspect was lacking during first interviews, as indicated by librarians themselves.

To compare requester and librarian satisfaction in corresponding groups, let us take one satisfaction measure at a time. Variables 33/42 ("enjoyment in working with each other") shows nothing new. Requesters across the various groups are similarly satisfied and so are librarians. But as noted before, requesters in the seven interviews with terminals are happiest, as are the corresponding librarians. It is difficult to offer more than a tentative explanation for this; that is, requesters enjoyed the technology involvement, while librarians found refuge in it. This would mean that here we are dealing not so much with actual enjoyment of working with each other, but rather a process which distracted them from it.

Variables 35/44 ("satisfaction with the interview") sees librarians, on the whole, less satisfied than requesters. The "terminal" groups of requesters (n=7) is again happiest, but not so the librarians, who prefer the interviews without terminals (n=32).

Also, here librarians express their very lowest satisfaction with the first interview ($\bar{X}$=1.35). This is the worst score in the entire Table 25 matrix.

Variables 37/46 ("generally a successful interview") must be tapping a different criterion, a less personal basis of assessment, because the scores are quite different from the previous variables (35/44). The requesters show no great variations, aside from the small and happy "terminal" group. The librarians, however, find these same "terminal" interviews least successful, underscoring the going suspicion that requesters and librarians come from different vantage points in their assessments.

Variables 39/48 ("felt at ease") shows the most marked difference between the requesters and librarians. For example, requesters indicate the least ease in the absence of terminals (n=32), while the librarians are relatively comfortable there. This is consistent with what we just found above, regarding variables 35/44 and the terminal group. Actually, librarians seem quite ill at ease when terminals are involved, or when it is a first interview. Their scores are the second and third lowest in the entire matrix.

Overall, it looks like most librarians felt ill at ease, no matter which group it is. But that is not to say that all, without exception, were uncomfortable, because the mean score should be viewed here in the light of the rather large variances reported for variable 48.

Variables 41/50 ("interview met my expectations") underscores the same discrepancy in the vantage points of assessment

used by librarians and patrons. The librarians again have shown less satisfaction overall. It is interesting that, compared to all other user satisfactions, here requesters seem least satisfied, whatever their expectations were. Yet, if you glance at user scores for variable 37 above, you realize that their unmet expectations in variable 41 did not negatively influence their high assessments of interview success in general; that is also a matter of great agreement among all requesters, since the variances are very small for variable 37.

Overall, we are left with the feeling of a fairly satisfied requester group and a number of disgruntled librarians. As mentioned at different points in this report, this is not surprising. The librarians work with a different set of criteria in assessing the interaction as compared to the requesters. The librarians appear to be on the conservative side, and also are more demanding of themselves, have more stringent expectations as to how the process should work, and found less relief than requesters in trying to make the interviews work according to such strict expectations because they were under a real, as well as preceived, pressure engendered by the experimental situation and scrutiny. In brief, the requesters had it easy, and it shows. The librarians had it very hard, and they tried their best, including the honest assessments they offered.

Interview groups presenting contrasts in satisfaction assessments

To exhaust the possible approaches to the relationships between levels of satisfaction and nonverbal behaviors, we combined the interviews in groups by using two manipulations of the information available to us. First, in pursuing discrepancies in satisfaction levels, we settled on three aspects of satisfaction measurement from the six initially analyzed (see Appendix 1). Pursuing all six satisfaction measures proved unfruitful, since only three activatly showed meaningful association with nonverbal behaviors in previous analyses. Thus, we selected the three satisfaction variables with the most promise -- 33/42, 39/48, and 41/50 -- as a basis for our group differentiations. Next, we formed eight groups of interviews for each of the above three variables by using the median split of satisfaction scores for librarians and for requesters. Above the median was "high," below it was "low." This produced quite a few various groupings within the 39 interviews with two respondent scores in each, treated separately for the purpose of grouping. The result was eight groups for two respondents on three satisfaction measures. For each of these groups we then calculated the means and variances of nonverbal behaviors or relevance, seeking significant contrasts in nonverbal behaviors displayed, via the ANOVA procedure. The definitions of the eight contrasting satisfaction groups we used was as follows, with the corresponding labels:

Both low	(B/LOW)	Both librarians and requesters were below median.
Both high	(BHIGH)	Both librarians and requesters were above median.
High librarian/ Low requester	(HLIB/LOWUS)	While librarian was above median, requester was below median in the same interview, on a given satisfaction measure.
Low librarian/ High requester	(LLIB/HIGHU)	While requester was above median, librarian was below median in the same interview, on a given satisfaction measure.
Low librarian	(LOWLI)	Singled out interview where the librarian was below median, no matter where the requester was. This was a way to enlarge the group and trace effects on librarians in isolation from requester consideration.
High librarian	(HIGHL)	Singled out interview where the librarian was above median, no matter where the requester was...
Low requester	(LOWUS)	Singled out interview where the requester was below median, no matter where the librarian was...
High requester	(HIGHU)	Singled out interview where the requester was above median, no matter where the librarian was...

Finally, we ran corresponding bar graphs as visual supports to ANOVA results. These results indicated no differentiations on the user side, but three on the librarian side. In all cases, the only satisfaction measure that "engaged" was 41/50 ("the interview met my expectations") as a catch-all satisfaction assessment. The findings here confirmed previous results reported in

Table 24.

There was only one aspect which approached, but did not achieve, significance (.06) for requesters' touch adaptors (Table 26, Figure 1). The data show the highest number of touch adaptors associated mildly with low reported satisfaction on 50 (see groups LLIB and LOWLI), i.e., a lot of touch adaptor activity on the part of the requester impacted negatively on the librarian's satisfaction. This suggests librarian sensitivity to requester appearance of discomfort.

On the other hand, three aspects on the librarian side reached solid significance levels: looking alone, touch adaptors, and shifts (Tables 27-29, and Figures 2-4). The results in all three cases related primarily to the group "both low" suggesting that those nonverbal behaviors displayed by the librarian are linked to both librarian and requester dissatisfactions during three interviews (B/LOW n=3).

Table 27 (Figure 2) shows data on librarian looking alone. High levels of glancing in isolation are linked to low satisfaction in both interactants (n=3). The next best association there is with group "LOWLI" (n=15) underscoring that librarian dissatisfaction was related to "out of synch" circumstances when their glancing was not being reciprocated by the patron in 15 of the interviews.

Table 28 (Figure 3) shows data on touch adaptors displayed by librarians. Again the group "both low" (n=3) is linked to the highest amount of adaptors. The next best association there is again with group "LOWLI" (n=15). This indicated that librarian

discomfort was correctly reflected in their nonverbal behavior through adaptors. This further surfaces in their low satisfaction assessment on variable 50; the interview had not met their expectations.

Table 29 (Figure 4) contains data on librarian shifts of body posture. Here again, in three interviews (both low) much librarian shifting is linked to low satisfaction in both people. No secondary association of note appear here, suggesting little significance to this aspect of the interaction.

Table 26. Requester Touch Adaptors by Groups, Satisfaction on 50/41 ("Interview Meeting Expectations")

ANOVA ANALYSIS/CASE CLASSED BY VAR50 AND 41/RESPID=2

DECEMBER 2, 1980

ANALYSIS OF VARIANCE PROCEDURE

DEPENDENT VARIABLE: TOUCH

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F
MODEL	7	11777.03117953	1682.43302565	2.00	0.0615
ERROR	109	91822.19958970	842.40550082		
CORRECTED TOTAL	116	103599.23076923			

R-SQUARE	C.V.	STD DEV	TOUCH MEAN
0.113679	112.2961	29.02422266	25.84615385

SOURCE	DF	ANOVA SS	F VALUE	PR > F
CASE	7	11777.03117953	2.00	0.0615

38

MEDIAN

VAR 50 4.9

VAR 41 5.9

CASE	N	$\bar{X}$ TOUCH
B/LOW	3	31.0000000
BHIGH	19	18.4210526
HIGHL	24	16.6666667
HIGHU	31	27.9032258
HLIB/	5	10.0000000
LLIE/	12	42.9166667
LOWLI	15	40.5333333
LOWUS	8	17.8750000

55

56

Figure 1. Case by Variable 50 & 41/ Respondent=2 (Requester)

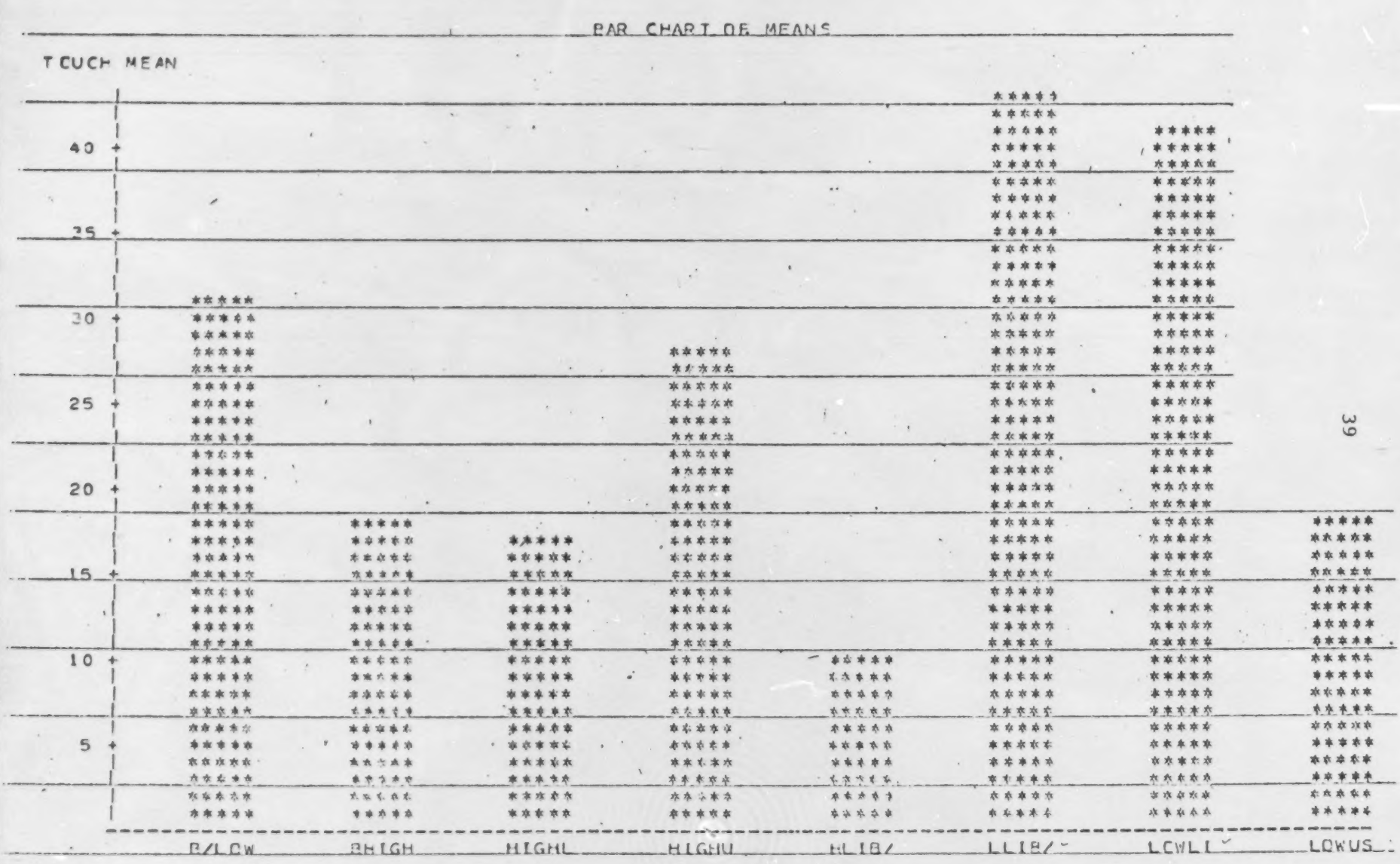


Table 27. Librarian Looking Alone by Groups, Satisfaction on 50/41

ANOVA ANALYSIS/CASE CLASSED BY VAR50 AND 41/RESPID=1

ANALYSIS OF VARIANCE PROCEDURE

DEPENDENT VARIABLE: LOOKA

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F
MODEL	7	2012.41581668	287.48797381	3.75	0.0012
ERROR	109	8362.66110640	76.72166153		
CORRECTED TOTAL	116	10375.07692308			

R-SQUARE	C.V.	STD DEV	LOOKA MEAN
0.193966	81.1412	8.75909022	10.79487179

SOURCE	DF	ANOVA SS	F VALUE	PR > F
CASE	7	2012.41581668	3.75	0.0012

40

ANALYSIS OF VARIANCE PROCEDURE

MEANS

MEDIANS
VAR 50 4.9
VAR 41 5.9

CASE	N	LOOKA	TOUCH	SHIFTS
B/LOW	3	23.3333333	46.0000000	12.6666667
BHIGH	19	6.3684211	11.8947368	1.6315789
HIGHL	24	7.2916667	11.5000000	1.6666667
HIGHU	31	9.5806452	19.1612903	2.5483871
HLIB/	5	10.8000000	10.0000000	1.8000000
LLIB/	12	14.6666667	30.6666667	4.0000000
LOWLI	15	16.4000000	33.7333333	5.7333333
LOWUS	8	15.5000000	23.5000000	5.8750000

59

60

Figure 2. Case by Variable 50 & 41/ Respondent=1 (Librarian)

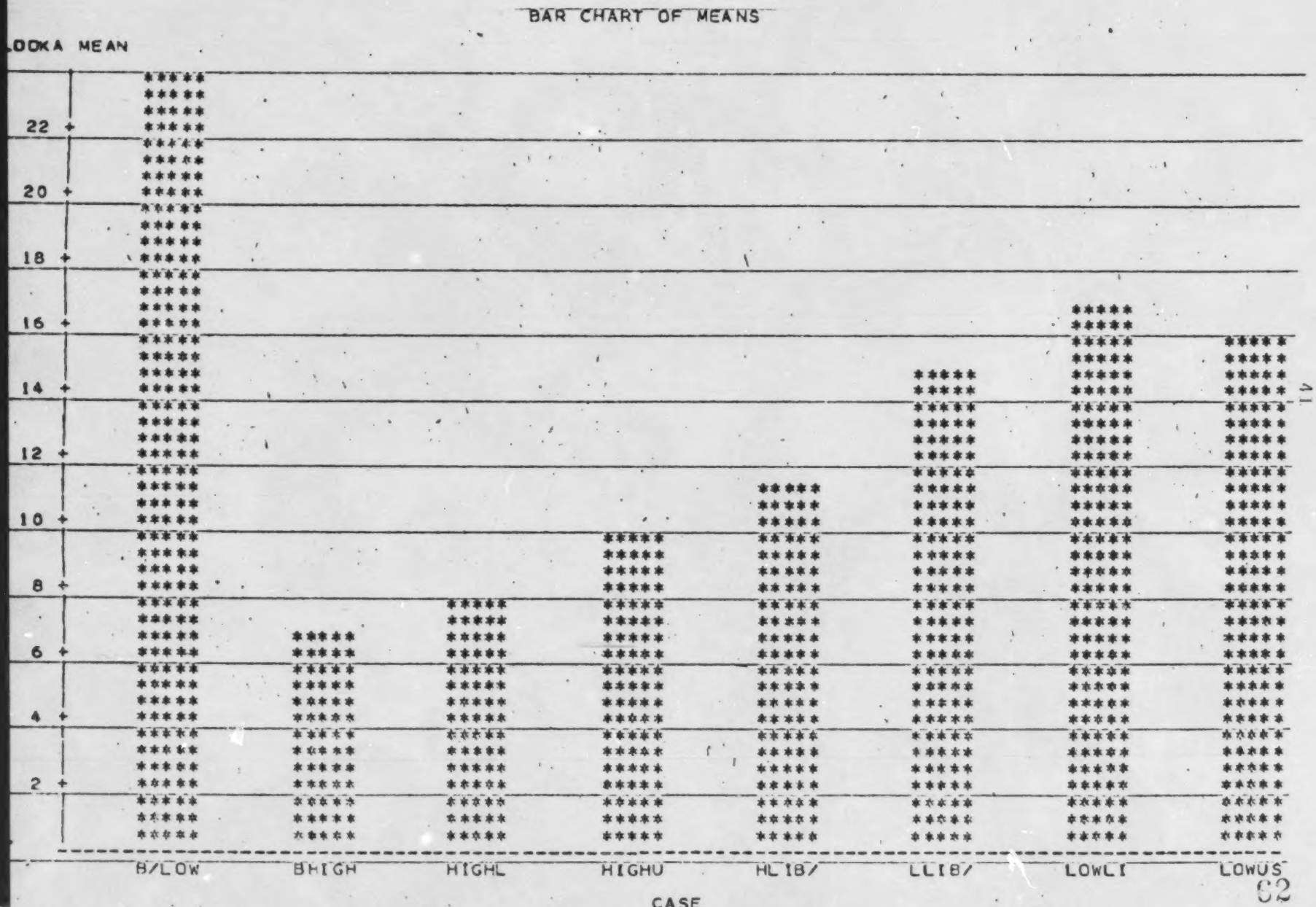


Table 28. Librarian Touch Adaptors by Groups, Satisfaction on 50/41

ANOVA ANALYSIS/CASE CLASSED BY VAR50 AND 41/RESPID=1

ANALYSIS OF VARIANCE PROCEDURE

DEPENDENT VARIABLE: TOUCH

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F
MODEL	7	9824.10928562	1403.44418366	3.51	0.0020
ERROR	109	43581.58302207	399.83103690		
CORRECTED TOTAL	116	53405.69230769			

R-SQUARE	C.V.	STD DEV	TOUCH MEAN
0.183952	99.7232	19.99577548	20.05128205

SOURCE	DF	ANOVA SS	F VALUE	PR > F
CASE	7	9824.10928562	3.51	0.0020

Figure 3. Case by Variable 50 & 41 / Respondent=1 (Librarian)

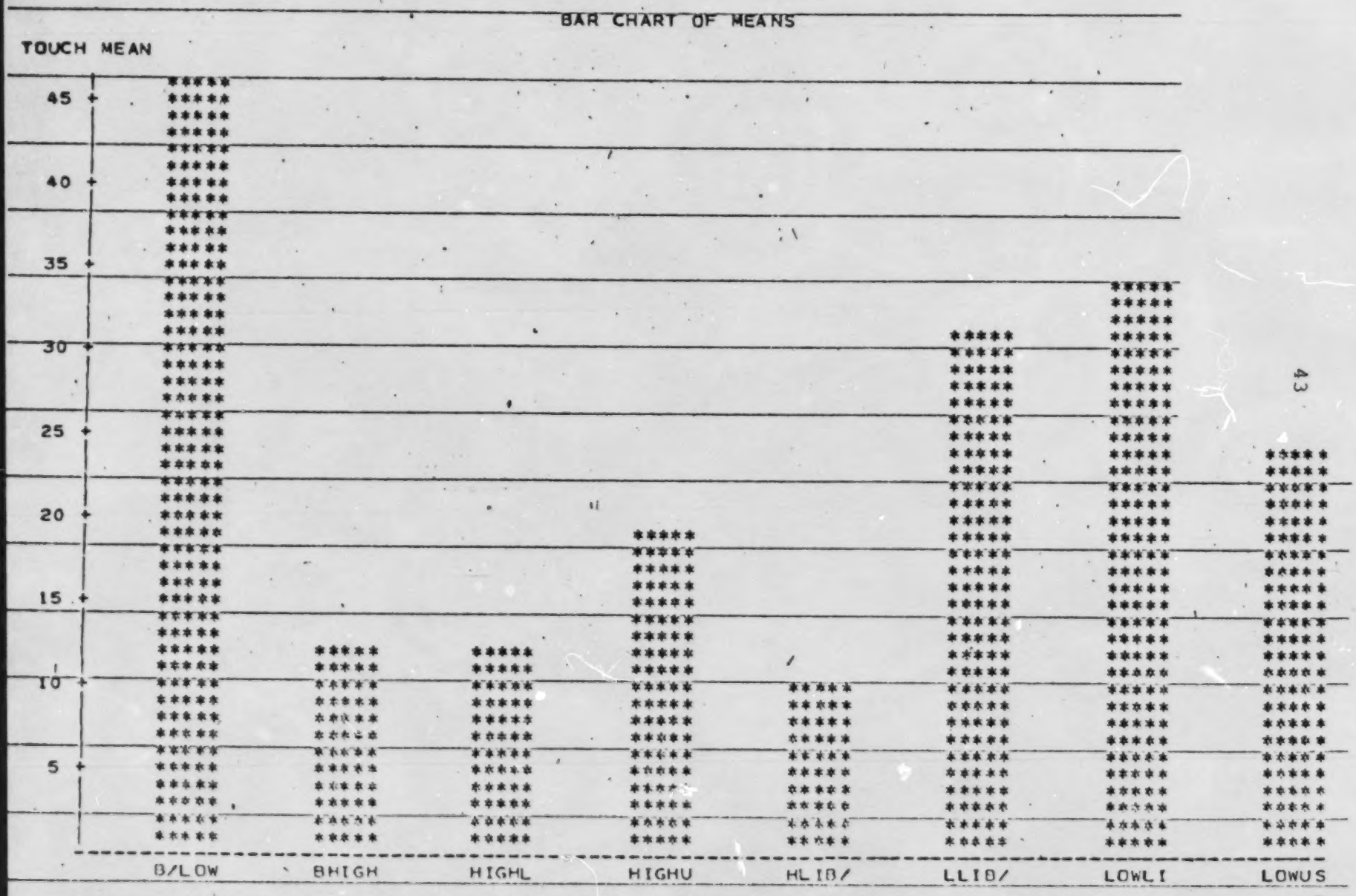


Table 29. Librarian Shifts by Groups, Satisfaction on 50/41

ANOVA ANALYSIS/CASE CLASSED BY VAR50 AND 41/RESPID=1

ANALYSIS OF VARIANCE PROCEDURE

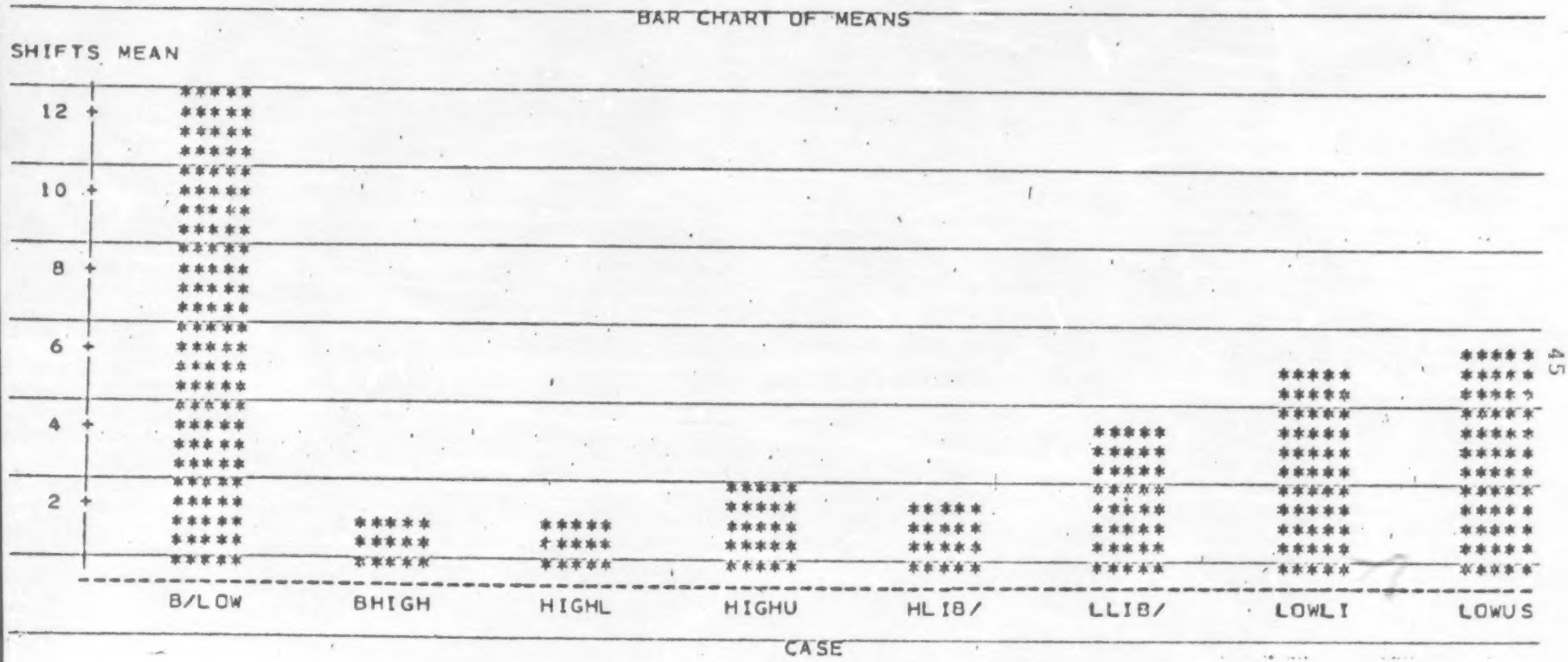
DEPENDENT VARIABLE: SHIFTS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F
MODEL	7	556.06242545	79.43748935	4.36	0.0003
ERROR	109	1984.70680532	18.20831931		
CORRECTED TOTAL	116	2540.76923077			

R-SQUARE	C.V.	STD DEV	SHIFTS MEAN
0.218856	132.0775	4.26712073	3.23076923

SOURCE	DF	ANOVA SS	F VALUE	PR > F
CASE	7	556.06242545	4.36	0.0003

Figure 4. Case by Variable 41 & 50/ Respondent=1 (Librarian)



45

IV. Conclusions

As seen above, the analysis of nonverbal behaviors in relation to satisfaction measures did yield some concomitant patterns. Thus:

(a) librarians felt least at ease during their first interview;

(b) requesters indicated highest satisfaction with interviews using terminals;

(c) correlational evidence linked isolated requester laughter, requester touch adaptors, as well as longer interviews and interview interruptions, to lower librarian satisfaction;

(d) requester experience was positively correlated with librarian enjoyment of the interview;

(e) requester satisfaction correlated negatively with librarian shifts, but no other nonverbal behaviors;

(f) librarian satisfaction correlated negatively with requester touch adaptors;

(g) librarian satisfaction correlated negatively with their own nonverbal behaviors;

(h) difference tests reaffirmed some of the above (i.e., (f) and (g)); and

(i) overall, requesters as a group were much more satisfied than librarians as a group.

First, it is important to note that the work reported here clearly indicated that analysis of interactive nonverbal behaviors is a potentially fruitful aspect of the overall effort. Yet the interpretation is mapped by the need to discuss design and data collection improvements as the main point of conclusions and recommendations for future research. We can see that something was going on, but it is hard to argue (though easy to speculate) as to why. The associative and difference nature of test results

precludes any directional assertions of relationship. For example, it seems reasonable to propose that observed nonverbal behaviors did reflect negative aspects, lowering satisfaction, such as librarians ill at ease. As such, the nonverbal behaviors can be seen as a useful "diagnostic" of interactions gone wrong. But was it negative aspects of the interaction which dampened satisfaction? The negative internal states of librarians, which we notice through nonverbal signs, could be traced also to the effects of the experimental condition and its stress. Such stress could have carried over during interviews (where we noticed it nonverbally), interferred with optimum performances, and ultimately, found reflection in low satisfaction assessments. Our results did show that librarians as a group were markedly less happy with the whole process, and its outcome. The requesters generally walked away satisfied, if their end-assessments are an indication to trust. So the results leave little doubt that tracing of nonverbal aspects of the interaction emerged as a good diagnostic and a descriptive tool. In order to extend it further toward explanation, however, several suggestions for future improvement are necessary. The experimental context must be modified in ways that are difficult to achieve -- less obtrusiveness and more control. This could reduce possible librarian reactions and allow a picture closer to their routine performance to be recorded. It could also allow for distinction between various interactive and external stimuli that impacted on the interview atmosphere. For example, starting the interview <u>already</u> uneasy vs. <u>becoming</u> uneasy during the interview, and reasons

thereof. The satisfaction assessment measures need much refinement to bring them from the current level of generality down to more specific report of internal states, interaction aspects, process components, and overall performance issues. Information on the search outcome and evaluations of the output would be very useful, as an issue separate from satisfactions at the close of the interview. In light of the contrasting reactions of requesters and librarians toward the use of terminals, a larger number of such interviews will be promising. The small n this time limits our ability to go further than we have in noting satisfaction discrepancies. A much larger number of interviews than presently available may not be necessary, but more information about the requesters will help, since no control over variability is possible there. Finally, improved visual quality of tapes would do much to enhance coding precision and validity, and cut down time.

APPENDIX 1. Satisfaction Measure Subset Used

As mentioned earlier, we focused on the relational subset of satisfaction measures related to the interactive climate of the interview and thus most relevant to our exploration. These were as follows:

User satisfaction measures --

Var. 33: I enjoyed working with the search analyst.

Var. 35: I was very satisfied with the interview.

Var. 37: Generally it was a successful interview.

Var. 39: I felt at ease during the interview.

Var. 33/39: (This combined score was used as the closest measure we could get regarding the relational climate during the interview.)

Var. 41: The interview met my expectations.

Librarian satisfaction measures were identical to the user items in every respect --

Vars. 42, 44, 46, 48, 42/48, and 50

We ultimately used only three measures -- variables 33/42, 39/48, and 41/50 -- based on their activation in subsequent analyses and the promise of showing meaningful associations with nonverbal behaviors.

APPENDIX 2

Table 2A

Interview length

First interviews only (n=13)

VALUE	COUNT	PERCENTS CELL	CUM
3	1	7.7	7.7
5	2	15.4	23.1
6	2	15.4	38.5
9	2	15.4	53.8
10	2	15.4	69.2
11	1	7.7	76.9
13	1	7.7	84.6
14	1	7.7	92.3
17	1	7.7	100.0

	13		
MEAN	9.07692		
STD DEV	4.05096	VARIANCE	16.4103
SKEWNESS	0.396371	KURTOSIS	-0.406948

QUANTILES

100% MAX	17
75% Q3	12
50% MED	9
25% Q1	5.5
0% MIN	3
RANGE	14
Q3-Q1	6.5
MODE	5

Excluding firsts (n=26)

VALUE	COUNT	PERCENTS CELL	CUM
2	2	7.7	7.7
3	3	11.5	19.2
4	4	15.4	34.6
5	2	7.7	42.3
6	2	7.7	50.0
7	2	7.7	57.7
10	1	3.8	61.5
11	2	7.7	69.2
13	1	3.8	73.1
16	1	3.8	76.9
18	1	3.8	80.8
20	2	7.7	88.5
25	1	3.8	92.3
27	1	3.8	96.2
34	1	3.8	100.0

N	26		
MEAN	10.3848		
STD DEV	8.75478	VARIANCE	76.646
SKEWNESS	1.24685	KURTOSIS	0.78127

QUANTILES

100% MAX	34
75% Q3	16.5
50% MED	6.5
25% Q1	4
0% MIN	2
RANGE	32
Q3-Q1	12.5
MODE	4

Terminal use

VALUE	COUNT	PERCENTS CELL	CUM
0	10	76.9	76.9
1	3	23.1	100.0

VALUE	COUNT	PERCENTS CELL	CUM
0	22	84.6	84.6
1	4	15.4	100.0

Interruptions

VALUE	COUNT	PERCENTS CELL	CUM
0	7	53.8	53.8
1	6	46.2	100.0

N	26		
MEAN	0.576923		
STD DEV	1.02657	VARIANCE	1.05385
SKEWNESS	2.17932	KURTOSIS	4.75398

VALUE	COUNT	PERCENTS CELL	CUM
0	17	65.4	65.4
1	6	23.1	88.5
2	1	3.8	92.3
3	1	3.8	96.2
4	1	3.8	100.0

QUANTILES

100% MAX	4
75% Q3	1
50% MED	0
25% Q1	0
0% MIN	0
RANGE	4
Q3-Q1	1
MODE	0

APPENDIX 2

Table 2B

Laugh, shared

First interview only

VALUE	COUNT	PERCENTS CELL	CUM
0	8	61.5	61.5
1	4	30.8	92.3
2	1	7.7	100.0

AN	0.461538		
D DEV	0.660225	VARIANCE	0.435897
EWNESS	1.19065	KURTOSIS	0.645297

13

QUANTILES

100% MAX	2
75% Q3	1
50% MED	0
25% Q1	0
0% MIN	0
RANGE	2
Q3-Q1	1
MODE	0

Excluding firsts

VALUE	COUNT	PERCENTS CELL	CUM
0	17	65.4	65.4
1	5	19.2	84.6
2	3	11.5	96.2
5	1	3.8	100.0

N	26		
MEAN	0.615385		
STD DEV	1.13409	VARIANCE	1.28615
SKEWNESS	2.63159	KURTOSIS	8.38644

QUANTILES

100% MAX	5
75% Q3	1
50% MED	0
25% Q1	0
0% MIN	0
RANGE	5
Q3-Q1	1
MODE	0

Smile, shared

VALUE	COUNT	PERCENTS CELL	CUM
0	4	30.8	30.8
1	7	53.8	84.6
2	1	7.7	92.3
3	1	7.7	100.0

EAN	0.923077		
TD DEV	0.862316	VARIANCE	0.74359
KEWNESS	1.08514	KURTOSIS	1.77231

13

QUANTILES

100% MAX	3
75% Q3	1
50% MED	1
25% Q1	0
0% MIN	0
RANGE	3
Q3-Q1	1
MODE	1

VALUE	COUNT	PERCENTS CELL	CUM
0	12	46.2	46.2
1	8	30.8	76.9
2	6	23.1	100.0

N	26		
MEAN	0.769231		
STD DEV	0.815239	VARIANCE	0.66461
SKEWNESS	0.465666	KURTOSIS	-1.3247

QUANTILES

100% MAX	2
75% Q3	1.25
50% MED	1
25% Q1	0
0% MIN	0
RANGE	2
Q3-Q1	1.25
MODE	0

APPENDIX 2

Table 2C — Eye contact

First interviews only

VALUE	COUNT	PERCENTS CELL	CUM
4	1	7.7	7.7
5	1	7.7	15.4
7	1	7.7	23.1
8	1	7.7	30.8
12	2	15.4	46.2
13	1	7.7	53.8
19	1	7.7	61.5
20	1	7.7	69.2
28	1	7.7	76.9
32	1	7.7	84.6
45	1	7.7	92.3
46	1	7.7	100.0

N	13
MEAN	19.3077
STD DEV	14.3607
SKEWNESS	0.925157
VARIANCE	206.231
KURTOSIS	-0.30158

QUANTILES

100% MAX	46
75% Q3	30
50% MED	13
25% Q1	7.5
0% MIN	4
RANGE	42
Q3-Q1	22.5
MODE	12

Excluding firsts

VALUE	COUNT	PERCENTS CELL	CUM
1	1	3.8	3.8
2	1	3.8	7.7
3	3	11.5	19.2
6	2	7.7	26.9
7	1	3.8	30.8
8	2	7.7	38.5
9	1	3.8	42.3
11	3	11.5	53.8
13	1	3.8	57.7
15	1	3.8	61.5
17	1	3.8	65.4
20	3	11.5	76.9
34	1	3.8	80.8
38	1	3.8	84.6
57	1	3.8	88.5
60	1	3.8	92.3
63	1	3.8	96.2
78	1	3.8	100.0

N	26
MEAN	20.1538
STD DEV	21.4936
SKEWNESS	1.52714
VARIANCE	461.975
KURTOSIS	1.31455

QUANTILES

100% MAX	78
75% Q3	23.5
50% MED	11
25% Q1	6
0% MIN	1
RANGE	77
Q3-Q1	17.5
MODE	3

APPENDIX 2

Table 2D

Laugh alone

First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	10	76.9	76.9
1	1	7.7	84.6
2	2	15.4	100.0

N	13
MEAN	0.384615
STD DEV	0.767948
SKEWNESS	1.76025
VARIANCE	0.589744
KURTOSIS	1.61523

QUANTILES	
100% MAX	2
75% Q3	0.5
50% MED	0
25% Q1	0
0% MIN	0
RANGE	2
Q3-Q1	0.5
MODE	0

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	12	92.3	92.3
3	1	7.7	100.0

N	13
MEAN	0.230769
STD DEV	0.83205
SKEWNESS	3.60555
VARIANCE	0.692308
KURTOSIS	13

QUANTILES	
100% MAX	3
75% Q3	0
50% MED	0
25% Q1	0
0% MIN	0
RANGE	3
Q3-Q1	0
MODE	0

Excluding first interviews

VALUE	COUNT	PERCENTS CELL	CUM
0	17	65.4	65.4
1	2	7.7	73.1
2	5	19.2	92.3
3	1	3.8	96.2
4	1	3.8	100.0

N	26
MEAN	0.730769
STD DEV	1.15092
SKEWNESS	1.42844
VARIANCE	1.32462
KURTOSIS	1.20085

QUANTILES	
100% MAX	4
75% Q3	2
50% MED	0
25% Q1	0
0% MIN	0
RANGE	4
Q3-Q1	2
MODE	0

VALUE	COUNT	PERCENTS CELL	CUM
0	21	80.8	80.8
1	3	11.5	92.3
2	1	3.8	96.2
4	1	3.8	100.0

N	26
MEAN	0.346154
STD DEV	0.891843
SKEWNESS	3.25429
VARIANCE	0.795385
KURTOSIS	11.6051

QUANTILES	
100% MAX	4
75% Q3	0
50% MED	0
25% Q1	0
0% MIN	0
RANGE	4
Q3-Q1	0
MODE	0

APPENDIX 2

Table 2E

Smile alone

First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	6	46.2	46.2
1	4	30.8	76.9
2	1	7.7	84.6
3	1	7.7	92.3
12	1	7.7	100.0

N	13
MEAN	1.61538
STD DEV	3.25419
SKEWNESS	3.13327
VARIANCE	10.5897
KURTOSIS	10.4266

QUANTILES

100% MAX	12
75% Q3	1.5
50% MED	1
25% Q1	0
0% MIN	0
RANGE	12
Q3-Q1	1.5
MODE	0

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	6	46.2	46.2
1	2	15.4	61.5
2	3	23.1	84.6
3	2	15.4	100.0

N	13
MEAN	1.07692
STD DEV	1.18754
SKEWNESS	0.534474
VARIANCE	1.41026
KURTOSIS	-1.32043

QUANTILES

100% MAX	3
75% Q3	2
50% MED	1
25% Q1	0
0% MIN	0
RANGE	3
Q3-Q1	2
MODE	0

Excluding firsts

VALUE	COUNT	PERCENTS CELL	CUM
0	8	30.8	30.8
1	7	26.9	57.7
2	4	15.4	73.1
3	3	11.5	84.6
5	2	7.7	92.3
8	1	3.8	96.2
11	1	3.8	100.0

N	26
MEAN	2.03846
STD DEV	2.66054
SKEWNESS	2.09523
VARIANCE	7.07846
KURTOSIS	4.74097

QUANTILES

100% MAX	11
75% Q3	3
50% MED	1
25% Q1	0
0% MIN	0
RANGE	11
Q3-Q1	3
MODE	0

VALUE	COUNT	PERCENTS CELL	CUM
0	15	57.7	57.7
1	7	26.9	84.6
2	2	7.7	92.3
4	2	7.7	100.0

N	26
MEAN	0.730769
STD DEV	1.15092
SKEWNESS	1.94007
VARIANCE	1.32462
KURTOSIS	3.50237

QUANTILES

100% MAX	4
75% Q3	1
50% MED	0
25% Q1	0
0% MIN	0
RANGE	4
Q3-Q1	1
MODE	0

APPENDIX 2

Table 2F

Look alone

First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	2	15.4	15.4
1	1	7.7	23.1
3	1	7.7	30.8
5	1	7.7	38.5
7	2	15.4	53.8
11	1	7.7	61.5
16	2	15.4	76.9
19	1	7.7	84.6
27	1	7.7	92.3
29	1	7.7	100.0

N	13
MEAN	10.8462
STD DEV	9.86447
SKEWNESS	0.688549
VARIANCE	97.3077
KURTOSIS	-0.650841

QUANTILES	
100% MAX	29
75% Q3	17.5
50% MED	7
25% Q1	2
0% MIN	0
RANGE	29
Q3-Q1	15.5
MODE	0

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
2	4	30.8	30.8
3	1	7.7	38.5
4	1	7.7	46.2
5	1	7.7	53.8
6	1	7.7	61.5
7	1	7.7	69.2
8	1	7.7	76.9
12	1	7.7	84.6
14	2	15.4	100.0

N	13
MEAN	6.23077
STD DEV	4.53052
SKEWNESS	0.832767
VARIANCE	20.5256
KURTOSIS	-0.712703

QUANTILES	
100% MAX	14
75% Q3	10
50% MED	5
25% Q1	2
0% MIN	2
RANGE	12
Q3-Q1	8
MODE	2

Excluding firsts

VALUE	COUNT	PERCENTS CELL	CUM
0	3	11.5	11.5
1	3	11.5	23.1
2	1	3.8	26.9
3	1	3.8	30.8
4	1	3.8	34.6
5	1	3.8	38.5
6	2	7.7	46.2
8	2	7.7	53.8
9	1	3.8	57.7
12	2	7.7	65.4
15	1	3.8	69.2
19	1	3.8	73.1
21	1	3.8	76.9
22	3	11.5	88.5
24	1	3.8	92.3
28	1	3.8	96.2
29	1	3.8	100.0

N	26
MEAN	10.7692
STD DEV	9.57207
SKEWNESS	0.543206
VARIANCE	91.6246
KURTOSIS	-1.12774

QUANTILES	
100% MAX	29
75% Q3	21.25
50% MED	8
25% Q1	1.75
0% MIN	0
RANGE	29
Q3-Q1	19.5

VALUE	COUNT	PERCENTS CELL	CUM
0	3	11.5	11.5
1	1	3.8	15.4
2	2	7.7	23.1
3	2	7.7	30.8
4	3	11.5	42.3
6	1	3.8	46.2
7	2	7.7	53.8
8	3	11.5	65.4
9	3	11.5	76.9
14	2	7.7	84.6
15	1	3.8	88.5
18	1	3.8	92.3
27	1	3.8	96.2
32	1	3.8	100.0

N	26
MEAN	8.23077
STD DEV	7.94132
SKEWNESS	1.60991
VARIANCE	63.0646
KURTOSIS	2.72646

QUANTILES	
100% MAX	32
75% Q3	10.25
50% MED	7
25% Q1	2.75
0% MIN	0
RANGE	32
Q3-Q1	7.5
MODE	0

APPENDIX 2

Nods

Table 2G

First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	1	7.7	7.7
1	1	7.7	15.4
2	1	7.7	23.1
4	1	7.7	30.8
5	1	7.7	38.5
6	2	15.4	53.8
7	2	15.4	69.2
10	1	7.7	76.9
23	1	7.7	84.6
37	1	7.7	92.3
64	1	7.7	100.0

N	13
MEAN	13.2308
STD DEV	18.3355
SKEWNESS	2.18945
VARIANCE	336.192
KURTOSIS	4.68671

QUANTILES

100% MAX	64
75% Q3	16.5
50% MED	6
25% Q1	3
0% MIN	0
RANGE	64
Q3-Q1	13.5
MODE	6

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
3	1	7.7	7.7
8	1	7.7	15.4
11	1	7.7	23.1
12	1	7.7	30.8
13	1	7.7	38.5
15	1	7.7	46.2
18	2	15.4	61.5
20	1	7.7	69.2
24	2	15.4	84.6
30	1	7.7	92.3
51	1	7.7	100.0

N	13
MEAN	19.
STD DEV	12.0816
SKEWNESS	1.56727
VARIANCE	145
KURTOSIS	3.63193

QUANTILES

100% MAX	51
75% Q3	24
50% MED	18
25% Q1	11.5
0% MIN	3
RANGE	48
Q3-Q1	12.5
MODE	18

Excluding firsts

VALUE	COUNT	PERCENTS CELL	CUM
0	1	3.8	3.8
1	2	7.7	11.5
2	2	7.7	19.2
4	1	3.8	23.1
5	2	7.7	30.8
6	1	3.8	34.6
7	2	7.7	42.3
8	3	11.5	53.8
11	1	3.8	57.7
12	2	7.7	65.4
13	1	3.8	69.2
14	1	3.8	73.1
15	1	3.8	76.9
16	1	3.8	80.8
17	1	3.8	84.6
31	1	3.8	88.5
54	1	3.8	92.3
67	1	3.8	96.2
134	1	3.8	100.0

N	26
MEAN	17.6923
STD DEV	28.3757
SKEWNESS	3.23678
VARIANCE	805.182
KURTOSIS	11.6064

QUANTILES

100% MAX	134
75% Q3	15.25
50% MED	8
25% Q1	4.75
0% MIN	0
RANGE	134
Q3-Q1	10.5
MODE	8

VALUE	COUNT	PERCENTS CELL	CUM
0	2	7.7	7.7
1	2	7.7	15.4
2	2	7.7	23.1
4	2	7.7	30.8
5	1	3.8	34.6
8	3	11.5	46.2
9	1	3.8	50.0
10	1	3.8	53.8
14	1	3.8	57.7
16	1	3.8	61.5
17	1	3.8	65.4
29	1	3.8	69.2
37	1	3.8	73.1
41	1	3.8	76.9
42	1	3.8	80.8
43	1	3.8	84.6
62	1	3.8	88.5
97	1	3.8	92.3
101	1	3.8	96.2
223	1	3.8	100.0

N	26
MEAN	30.1538
STD DEV	48.2607
SKEWNESS	2.93127
VARIANCE	2329.1
KURTOSIS	10.0715

QUANTILES

100% MAX	223
75% Q3	41.25
50% MED	9.5
25% Q1	3.5
0% MIN	0
RANGE	223
Q3-Q1	37.75

Table 2H

Gesturing

First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
2	1	7.7	7.7
9	2	15.4	23.1
17	2	15.4	38.5
20	1	7.7	46.2
22	1	7.7	53.8
30	1	7.7	61.5
45	1	7.7	69.2
66	1	7.7	76.9
70	1	7.7	84.6
73	1	7.7	92.3
140	1	7.7	100.0

N	13
MEAN	40
STD DEV	38.6631
SKEWNESS	1.57968
VARIANCE	1494.83
KURTOSIS	2.68863

QUANTILES

100% MAX	140
75% Q3	68
50% MED	22
25% Q1	13
0% MIN	2
RANGE	138
Q3-Q1	55
MODE	9

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
7	2	15.4	15.4
8	2	15.4	30.8
13	1	7.7	38.5
14	1	7.7	46.2
15	1	7.7	53.8
21	1	7.7	61.5
23	1	7.7	69.2
26	1	7.7	76.9
37	1	7.7	84.6
60	1	7.7	92.3
67	1	7.7	100.0

N	13
MEAN	23.5385
STD DEV	19.8268
SKEWNESS	1.43791
VARIANCE	393.103
KURTOSIS	1.12325

QUANTILES

100% MAX	67
75% Q3	31.5
50% MED	15
25% Q1	8
0% MIN	7
RANGE	60
Q3-Q1	23.5
MODE	7

Excluding firsts

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	1	3.8	3.8
2	1	3.8	7.7
9	1	3.8	11.5
14	1	3.8	15.4
15	1	3.8	19.2
17	1	3.8	23.1
20	2	7.7	30.8
21	1	3.8	34.6
23	1	3.8	38.5
29	1	3.8	42.3
31	1	3.8	46.2
33	1	3.8	50.0
37	1	3.8	53.8
38	1	3.8	57.7
42	1	3.8	61.5
51	1	3.8	65.4
52	1	3.8	69.2
68	1	3.8	73.1
69	1	3.8	76.9
73	1	3.8	80.8
74	1	3.8	84.6
116	1	3.8	88.5
117	1	3.8	92.3
119	1	3.8	96.2
130	1	3.8	100.0

N	26
MEAN	46.9231
STD DEV	38.2036
SKEWNESS	0.972618
VARIANCE	1459.51
KURTOSIS	-0.0773922

QUANTILES

100% MAX	130
75% Q3	70
50% MED	35
25% Q1	19.25
0% MIN	0
RANGE	130
Q3-Q1	50.75
MODE	20

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
1	2	7.7	7.7
2	1	3.8	11.5
5	3	11.5	23.1
6	1	3.8	26.9
9	1	3.8	30.8
10	1	3.8	34.6
13	1	3.8	38.5
16	1	3.8	42.3
17	1	3.8	46.2
19	1	3.8	50.0
23	1	3.8	53.8
26	1	3.8	57.7
32	2	7.7	65.4
34	2	7.7	73.1
47	1	3.8	76.9
74	1	3.8	80.8
78	1	3.8	84.6
92	1	3.8	88.5
98	1	3.8	92.3
175	1	3.8	96.2
336	1	3.8	100.0

N	26
MEAN	45.7692
STD DEV	71.5068
SKEWNESS	3.09865
VARIANCE	5113.22
KURTOSIS	11.0355

QUANTILES

100% MAX	336
75% Q3	53.75
50% MED	21
25% Q1	5.75
0% MIN	1
RANGE	335
Q3-Q1	48
MODE	5

APPENDIX 2

Table 21

Adaptors (touch)
First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
1	1	7.7	7.7
4	1	7.7	15.4
5	1	7.7	23.1
8	3	23.1	46.2
11	1	7.7	53.8
13	1	7.7	61.5
14	1	7.7	69.2
25	1	7.7	76.9
26	1	7.7	84.6
30	1	7.7	92.3
54	1	7.7	100.0

N	13
MEAN	15.9231
STD DEV	14.5514
SKEWNESS	1.65575
VARIANCE	211.744
KURTOSIS	3.00728

QUANTILES

100% MAX	54
75% Q3	25.5
50% MED	11
25% Q1	6.5
0% MIN	1
RANGE	53
Q3-Q1	19
MODE	8

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	1	7.7	7.7
2	1	7.7	15.4
4	1	7.7	23.1
8	1	7.7	30.8
9	1	7.7	38.5
14	1	7.7	46.2
16	1	7.7	53.8
19	1	7.7	61.5
24	1	7.7	69.2
29	1	7.7	76.9
43	1	7.7	84.6
47	1	7.7	92.3
62	1	7.7	100.0

N	13
MEAN	21.3077
STD DEV	19.1372
SKEWNESS	0.958245
VARIANCE	366.231
KURTOSIS	0.0771553

QUANTILES

100% MAX	62
75% Q3	36
50% MED	16
25% Q1	6
0% MIN	0
RANGE	62
Q3-Q1	30
MODE	0

Excluding firsts

VALUE	COUNT	PERCENTS CELL	CUM
2	5	19.2	19.2
4	1	3.8	23.1
5	2	7.7	30.8
6	1	3.8	34.6
7	1	3.8	38.5
8	3	11.5	50.0
12	1	3.8	53.8
13	1	3.8	57.7
18	1	3.8	61.5
27	2	7.7	69.2
28	1	3.8	73.1
32	1	3.8	76.9
37	1	3.8	80.8
43	1	3.8	84.6
52	1	3.8	88.5
56	1	3.8	92.3
80	1	3.8	96.2
89	1	3.8	100.0

N	26
MEAN	22.1154
STD DEV	24.4366
SKEWNESS	1.47875
VARIANCE	597.146
KURTOSIS	1.59071

QUANTILES

100% MAX	89
75% Q3	33.25
50% MED	10
25% Q1	4.75
0% MIN	2
RANGE	87
Q3-Q1	28.5
MODE	2

VALUE	COUNT	PERCENTS CELL	CUM
0	2	7.7	7.7
1	2	7.7	15.4
2	1	3.8	19.2
3	3	11.5	30.8
4	2	7.7	38.5
10	1	3.8	42.3
16	1	3.8	46.2
18	1	3.8	50.0
19	1	3.8	53.8
21	1	3.8	57.7
23	1	3.8	61.5
25	1	3.8	65.4
41	1	3.8	69.2
44	1	3.8	73.1
46	1	3.8	76.9
49	1	3.8	80.8
53	1	3.8	84.6
59	1	3.8	88.5
62	1	3.8	92.3
66	1	3.8	96.2
158	1	3.8	100.0

N	26
MEAN	28.1154
STD DEV	34.4686
SKEWNESS	2.28432
VARIANCE	1189.47
KURTOSIS	7.19075

QUANTILES

100% MAX	158
75% Q3	46.75
50% MED	18.5
25% Q1	3
0% MIN	0
RANGE	158
Q3-Q1	

Table 2J

Adaptors (object)
First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
3	1	7.7	7.7
4	1	7.7	15.4
5	2	15.4	30.8
7	1	7.7	38.5
10	2	15.4	53.8
11	1	7.7	61.5
15	1	7.7	69.2
24	1	7.7	76.9
37	1	7.7	84.6
38	1	7.7	92.3
66	1	7.7	100.0

N	13
MEAN	18.0769
STD DEV	18.6345
SKEWNESS	1.69655
VARIANCE	347.244
KURTOSIS	2.63295

QUANTILES

100% MAX	66
75% Q3	30.5
50% MED	10
25% Q1	5
0% MIN	3
RANGE	63
Q3-Q1	25.5
MODE	5

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	1	7.7	7.7
1	2	15.4	23.1
2	1	7.7	30.8
3	1	7.7	38.5
4	1	7.7	46.2
5	1	7.7	53.8
14	1	7.7	61.5
15	1	7.7	69.2
17	2	15.4	84.6
41	1	7.7	92.3
178	1	7.7	100.0

N	13
MEAN	22.9231
STD DEV	47.9487
SKEWNESS	3.27961
VARIANCE	2299.08
KURTOSIS	11.1964

QUANTILES

100% MAX	178
75% Q3	17
50% MED	5
25% Q1	1.5
0% MIN	0
RANGE	178
Q3-Q1	15.5
MODE	1

Excluding firsts

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
2	2	7.7	7.7
3	1	3.8	11.5
5	1	3.8	15.4
6	2	7.7	23.1
7	1	3.8	26.9
9	1	3.8	30.8
10	1	3.8	34.6
13	1	3.8	38.5
14	2	7.7	46.2
15	2	7.7	53.3
18	1	3.8	57.7
19	1	3.8	61.5
23	1	3.8	65.4
24	1	3.8	69.2
28	1	3.8	73.1
32	1	3.8	76.9
33	1	3.8	80.8
34	1	3.8	84.6
42	1	3.8	88.5
49	1	3.8	92.3
59	1	3.8	96.2
108	1	3.8	100.0

N	26
MEAN	22.6923
STD DEV	22.9081
SKEWNESS	2.32721
VARIANCE	524.782
KURTOSIS	6.99755

QUANTILES

100% MAX	108
75% Q3	32.25
50% MED	15
25% Q1	6.75
0% MIN	2
RANGE	106
Q3-Q1	25.5

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	1	3.8	3.8
1	2	7.7	11.5
2	1	3.8	15.4
3	2	7.7	23.1
4	1	3.8	26.9
5	2	7.7	34.6
6	1	3.8	38.5
7	3	11.5	50.0
8	1	3.8	53.8
14	1	3.8	57.7
15	1	3.8	61.5
30	1	3.8	65.4
33	1	3.8	69.2
34	2	7.7	76.9
41	1	3.8	80.8
48	1	3.8	84.6
59	1	3.8	88.5
65	1	3.8	92.3
124	1	3.8	96.2
239	1	3.8	100.0

N	26
MEAN	30.5769
STD DEV	50.966
SKEWNESS	3.1645
VARIANCE	2597.53
KURTOSIS	11.4759

QUANTILES

100% MAX	239
75% Q3	35.75
50% MED	7.5
25% Q1	3.75
0% MIN	0
RANGE	239
Q3-Q1	32

APPENDIX 2

Table 2K

Shifts

First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	4	30.8	30.8
1	5	38.5	69.2
2	2	15.4	84.6
3	1	7.7	92.3
4	1	7.7	100.0

N	13
MEAN	1.23077
STD DEV	1.23517
SKEWNESS	1.05391
VARIANCE	1.52564
KURTOSIS	0.722761

QUANTILES

100% MAX	4
75% Q3	2
50% MED	1
25% Q1	0
0% MIN	0
RANGE	4
Q3-Q1	2
MODE	1

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	2	15.4	15.4
1	1	7.7	23.1
2	1	7.7	30.8
3	1	7.7	38.5
5	1	7.7	46.2
8	2	15.4	61.5
9	1	7.7	69.2
10	1	7.7	76.9
11	1	7.7	84.6
13	1	7.7	92.3
16	1	7.7	100.0

N	13
MEAN	6.61538
STD DEV	5.20478
SKEWNESS	0.225493
VARIANCE	27.0897
KURTOSIS	-1.03108

QUANTILES

100% MAX	16
75% Q3	10.5
50% MED	8
25% Q1	1.5
0% MIN	0
RANGE	16
Q3-Q1	9
MODE	0

Excluding firsts

VALUE	COUNT	PERCENTS CELL	CUM
0	5	19.2	19.2
1	5	19.2	38.5
2	1	3.8	42.3
3	7	26.9	69.2
4	2	7.7	76.9
7	2	7.7	84.6
10	1	3.8	88.5
13	2	7.7	96.2
24	1	3.8	100.0

N	26
MEAN	4.23077
STD DEV	5.47047
SKEWNESS	2.30154
VARIANCE	30.0246
KURTOSIS	6.08235

QUANTILES

100% MAX	24
75% Q3	4.75
50% MED	3
25% Q1	1
0% MIN	0
RANGE	24
Q3-Q1	3.75
MODE	3

VALUE	COUNT	PERCENTS CELL	CUM
0	1	3.8	3.8
1	3	11.5	15.4
2	3	11.5	26.9
3	4	15.4	42.3
4	3	11.5	53.8
5	1	3.8	57.7
8	1	3.8	61.5
9	1	3.8	65.4
12	1	3.8	69.2
13	1	3.8	73.1
14	1	3.8	76.9
15	1	3.8	80.8
20	1	3.8	84.6
22	1	3.8	88.5
25	1	3.8	92.3
29	1	3.8	96.2
41	1	3.8	100.0

N	26
MEAN	9.46154
STD DEV	10.4047
SKEWNESS	1.55714
VARIANCE	108.258
KURTOSIS	2.13626

QUANTILES

100% MAX	41
75% Q3	14.25
50% MED	4
25% Q1	2
0% MIN	0
RANGE	41
Q3-Q1	12.25
MODE	3

Table-2L

Idleness

First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	9	69.2	69.2
1	2	15.4	84.6
2	2	15.4	100.0

N	13
MEAN	0.461538
STD DEV	0.77625
SKEWNESS	1.41283
VARIANCE	0.602564
KURTOSIS	0.546343

QUANTILES	
100% MAX	2
75% Q3	1
50% MED	0
25% Q1	0
0% MIN	0
RANGE	2
Q3-Q1	1
MODE	0

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	5	38.5	38.5
1	1	7.7	46.2
2	7	53.8	100.0

N	13
MEAN	1.15385
STD DEV	0.987096
SKEWNESS	-0.352636
VARIANCE	0.9743591
KURTOSIS	-2.11892

QUANTILES	
100% MAX	2
75% Q3	2
50% MED	2
25% Q1	0
0% MIN	0
RANGE	2
Q3-Q1	2
MODE	2

Excluding firsts

VALUE	COUNT	PERCENTS CELL	CUM
0	20	76.9	76.9
1	4	15.4	92.3
2	2	7.7	100.0

N	26
MEAN	0.307692
STD DEV	0.617688
SKEWNESS	1.91923
VARIANCE	0.381538
KURTOSIS	2.7193

100% MAX	2
75% Q3	0.25
50% MED	0
25% Q1	0
0% MIN	0
RANGE	2
Q3-Q1	0.25
MODE	0

VALUE	COUNT	PERCENTS CELL	CUM
0	13	50.0	50.0
1	4	15.4	65.4
2	9	34.6	100.0

N	26
MEAN	0.846154
STD DEV	0.92487
SKEWNESS	0.326703
VARIANCE	0.855385
KURTOSIS	-1.82417

100% MAX	2
75% Q3	2
50% MED	0.5
25% Q1	0
0% MIN	0
RANGE	2
Q3-Q1	2
MODE	0

APPENDIX 2

Table 2M

Idle activity

First interviews only

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	3	23.1	23.1
2	1	7.7	30.8
10	1	7.7	38.5
13	1	7.7	46.2
15	1	7.7	53.8
30	1	7.7	61.5
38	1	7.7	69.2
43	1	7.7	76.9
44	1	7.7	84.6
78	1	7.7	92.3
88	1	7.7	100.0

N	13
MEAN	* 27.7692
STD DEV	29.4821
SKEWNESS	1.0064
VARIANCE	869.192
KURTOSIS	0.0986435

QUANTILES

100% MAX	88
75% Q3	43.5
50% MED	15
25% Q1	1
0% MIN	0
RANGE	88
Q3-Q1	42.5
MODE	0

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	3	23.1	23.1
10	1	7.7	30.8
14	1	7.7	38.5
20	1	7.7	46.2
26	1	7.7	53.8
29	1	7.7	61.5
31	1	7.7	69.2
38	1	7.7	76.9
43	1	7.7	84.6
47	1	7.7	92.3
224	1	7.7	100.0

N	13
MEAN	* 37.0769
STD DEV	58.4387
SKEWNESS	3.12875
VARIANCE	3415.08
KURTOSIS	10.5836

QUANTILES

100% MAX	224
75% Q3	40.5
50% MED	26
25% Q1	5
0% MIN	0
RANGE	224
Q3-Q1	35.5
MODE	0

Excluding firsts

Librarians

VALUE	COUNT	PERCENTS CELL	CUM
0	10	38.5	38.5
5	2	7.7	46.2
6	1	3.8	50.0
10	1	3.8	53.8
15	2	7.7	61.5
16	1	3.8	65.4
17	3	11.5	76.9
18	2	7.7	84.6
20	1	3.8	88.5
26	1	3.8	92.3
28	1	3.8	96.2
188	1	3.8	100.0

N	26
MEAN	* 16.1923
STD DEV	36.2182
SKEWNESS	4.58555
VARIANCE	1311.76
KURTOSIS	22.3841

QUANTILES

100% MAX	188
75% Q3	17.25
50% MED	8
25% Q1	0
0% MIN	0
RANGE	188
Q3-Q1	17.25
MODE	0

Requesters

VALUE	COUNT	PERCENTS CELL	CUM
0	10	38.5	38.5
7	1	3.8	42.3
9	3	11.5	53.8
12	1	3.8	57.7
16	1	3.8	61.5
17	1	3.8	65.4
19	1	3.8	69.2
21	1	3.8	73.1
22	1	3.8	76.9
23	1	3.8	80.8
27	1	3.8	84.6
31	1	3.8	88.5
32	1	3.8	92.3
47	1	3.8	96.2
234	1	3.8	100.0

N	26
MEAN	20.5769
STD DEV	45.3724
SKEWNESS	4.47575
VARIANCE	2058.65
KURTOSIS	21.5354

QUANTILES

100% MAX	234
75% Q3	22.25
50% MED	9
25% Q1	0
0% MIN	0
RANGE	234
Q3-Q1	22.25
MODE	0

APPENDIX 3. Pairs of Motility Scores and Correlation Coefficients

(For each variable, first column = librarians, second = requesters.)

Partial correlations controlling for interview length:

Adaptors (touch)		Shifts		Nods		Gestures		Adaptors (object)	
.5445		.2811		.294		-.137		.056	
(p<.000)*		(p<.08)n.s.		(p<.07)n.s.		(p<.41)n.s.		(p<.73)n.s.	
27	19	3	15	7	37	117	34	108	34
7	0	0	1	1	14	0	10	13	6
14	9	0	3	7	8	20	26	24	0
4	16	1	5	10	11	45	37	5	17
2	3	1	2	5	0	9	6	2	5
6	0	1	4	11	8	38	5	18	3
8	21	4	9	12	1	42	17	28	14
5	18	1	3	4	4	21	13	23	65
2	3	3	1	1	4	2	1	3	15
25	24	4	16	1	20	17	8	10	178
89	158	13	25	17	2	73	92	33	124
5	14	0	1	4	51	2	15	5	1
54	62	1	10	37	24	70	7	11	5
52	25	3	13	16	29	51	34	5	1
13	16	10	3	6	8	14	23	6	0
8	8	1	8	7	3	9	13	4	2
30	47	1	9	6	18	73	21	66	14
1	4	0	0	2	18	17	7	7	3
8	3	2	2	8	9	37	19	15	4
13	2	2	0	23	30	66	67	38	1
2	2	0	1	2	5	23	1	6	1
8	1	1	3	13	17	15	5	15	41
2	10	0	0	12	1	20	5	7	59
43	53	7	20	134	97	119	78	59	7
11	29	2	11	0	13	30	23	15	15
56	66	7	14	2	43	116	47	14	8
26	43	1	8	6	15	22	14	10	17
28	59	1	3	14	2	17	32	42	33
27	23	3	5	7	16	69	32	32	5
2	1	0	2	5	10	29	2	24	3
8	19	0	13	64	24	140	60	37	41
5	41	0	4	8	8	31	9	14	2
12	62	3	8	54	0	52	336	34	239
4	4	4	4	31	41	33	16	10	30
37	49	3	41	67	223	74	175	9	7
18	44	3	12	8	62	68	74	19	48
8	0	3	2	5	12	9	8	3	4
32	4	13	29	0	42	20	26	2	7
80	46	24	22	15	101	130	98	49	34

Simple correlations:

(p<.0001) (p<.002) (p<.0008) (p<.01) (n.s.)

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